l. LXII No. 1 JANUARY 1961 50 CENTS

# CANADIAN GEOGRAPHICAL JOURNAL

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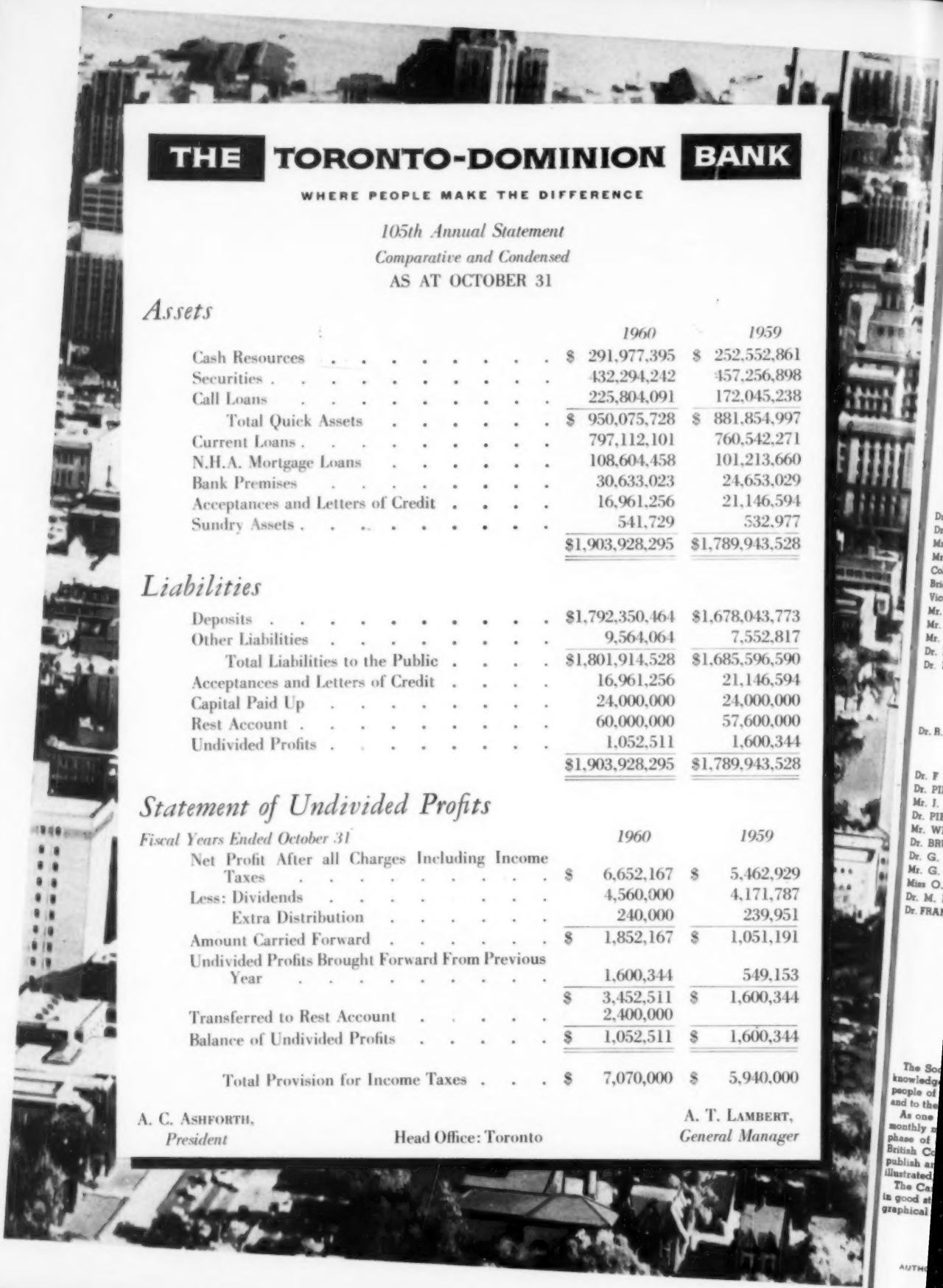

# THE TORONTO-DOMINION BANK

WHERE PEOPLE MAKE THE DIFFERENCE

*105th Annual Statement*

*Comparative and Condensed*

AS AT OCTOBER 31

## *Assets*

| | *1960* | *1959* |
|---|---|---|
| Cash Resources | $ 291,977,395 | $ 252,552,861 |
| Securities | 432,294,242 | 457,256,898 |
| Call Loans | 225,804,091 | 172,045,238 |
| Total Quick Assets | $ 950,075,728 | $ 881,854,997 |
| Current Loans | 797,112,101 | 760,542,271 |
| N.H.A. Mortgage Loans | 108,604,458 | 101,213,660 |
| Bank Premises | 30,633,023 | 24,653,029 |
| Acceptances and Letters of Credit | 16,961,256 | 21,146,594 |
| Sundry Assets | 541,729 | 532,977 |
| | $1,903,928,295 | $1,789,943,528 |

## *Liabilities*

| | | |
|---|---|---|
| Deposits | $1,792,350,464 | $1,678,043,773 |
| Other Liabilities | 9,564,064 | 7,552,817 |
| Total Liabilities to the Public | $1,801,914,528 | $1,685,596,590 |
| Acceptances and Letters of Credit | 16,961,256 | 21,146,594 |
| Capital Paid Up | 24,000,000 | 24,000,000 |
| Rest Account | 60,000,000 | 57,600,000 |
| Undivided Profits | 1,052,511 | 1,600,344 |
| | $1,903,928,295 | $1,789,943,528 |

## *Statement of Undivided Profits*

| *Fiscal Years Ended October 31* | *1960* | *1959* |
|---|---|---|
| Net Profit After all Charges Including Income Taxes | $ 6,652,167 | $ 5,462,929 |
| Less: Dividends | 4,560,000 | 4,171,787 |
| Extra Distribution | 240,000 | 239,951 |
| Amount Carried Forward | $ 1,852,167 | $ 1,051,191 |
| Undivided Profits Brought Forward From Previous Year | 1,600,344 | 549,153 |
| | $ 3,452,511 | $ 1,600,344 |
| Transferred to Rest Account | 2,400,000 | |
| Balance of Undivided Profits | $ 1,052,511 | $ 1,600,344 |
| Total Provision for Income Taxes | $ 7,070,000 | $ 5,940,000 |

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*President*

Head Office: Toronto

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*General Manager*

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# CANADIAN GEOGRAPHICAL JOURNAL

*Editor - WILLIAM J. MEGILL*

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✦

The articles in this Journal are indexed in the *International Index to Periodicals* and in the *Canadian Index*.

The British standard of spelling is adopted substantially as used by the Government of Canada and taught in most Canadian schools, the precise authority being the Concise Oxford Dictionary, fourth edition, 1951.

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*Rocher Déboulé Range, overlooking the confluence of the Skeena and Bulkley Rivers, near Hazelton, British Columbia.*

*Typical reconnaissance engineer's camp, by Fred Wright Lake, 65 miles northwest of Hazelton, British Columbia.*

XUM

# Railways March Northward

*by* J. L. CHARLES

Photographs by the author except where credited.

THE BASIC function of a railway is to haul maximum loads with a minimum of energy and cost.

This article is an endeavour to outline some features with respect to railway location and construction in Canada, particularly towards our Northlands.

Civil engineers' primary task is to survey lines to result in as low rates of ruling gradients as practicable in relation to sources of traffic, distances and costs for construction, maintenance and operation. This, together with their mechanical brothers' designs of motive power and car equipment, is the foundation for efficient operation, so essential to the economy of Canada, which to a large extent depends upon transportation of heavy bulk commodities over great land distances.*

Generally, the first step is to make a study of the controlling drainage courses. Therefore, the major routes adopted are often relative to the great waterways discovered by the pioneer fur-traders.

In "Lower" and "Upper" Canada the early railways were constructed to connect established settlements, but, to open the far greater regions to the west and to the north, railways took the initiative.

Surveys for the Canadian Pacific Railway were commenced westerly from the Ottawa River, at Mattawa, in 1871. The original route recommended for the Canadian Pacific Railway, west of Winnipeg, was by Lake Dauphin and through Battleford and Edmonton to the Yellowhead Pass, thence southwesterly, via the Thompson and Fraser Rivers, to the Pacific. Very favourable gradients were obtained; however, other factors including distance, were given weight and finally the route via Regina and Calgary with much heavier gradients, was adopted. Construction of this southerly line proved to be of major importance with respect to trade, which otherwise may have been diverted by north-south branch lines being built from railways in the United States.

Sir Sanford Fleming, Engineer-in-Chief, stated in his report on the following six years' work through to the Pacific coast, "It is difficult to convey an accurate impression of the magnitude of the work executed, which has every year employed the best energies of not far short of one thousand men of all grades. The length of the various lines surveyed and explored aggregate to close on 46,000 miles, of which no less than 11,500 miles have been labouriously measured, yard by yard, through mountains, prairie and forests, with the spirit level, chain and transit. Much of the work has been carried on amidst the severities of winter, frequently in an exceedingly low temperature. The surveying parties were far removed from all habitations and were supplied with but inadequate shelter and diet, although both were the best that circumstances would admit of".

The vision, courage and vigor of the pioneer railroaders continues as an example for all to endeavour to emulate.

The speed of construction between the Red River and Port Moody, 1,470 miles, from 1880 to the driving of the last spike 7th November 1885, set a pace which the present generation, with all the various types of modern equipment available, has not excelled.

Twenty to thirty years after the Canadian Pacific Railways' main line was brought into operation, two other trunk lines were completed; both took the northerly route through the Yellowhead Pass and are now amalgamated into the Canadian National Railways. These main lines formed the foundation for the structure of branch lines to be constructed.

### Lines Towards The North

One of the early branch lines towards the North was requested by settlers on the prairies for a railway to the closest point on tidewater — Hudson Bay — to obtain the minimum land haul for the export of grain to Europe. In 1889, the Lake Manitoba Railway and Canal Company was granted a charter to build to the Bay; this was acquired by Mackenzie and Mann and by 1908 they

*An example is the Canadian National Railways' main line to the west coast; the maximum rate of gradient, against export traffic, is four tenths of one foot vertical in one hundred feet horizontal. Two diesel-electric units, together generating 3,000 h.p. — with a train crew of four men — can haul 7,000 tons gross load.

XUM

pushed rails through to the Saskatchewan River at The Pas.

The Government of Canada took over from The Pas northerly and during 1911 grading was commenced, followed by bridging, tracklaying, etc. By 1918, rails were laid for a distance of 332 miles, to just north of the bridge crossing the Nelson River at Kettle Rapids. Conditions brought about by war caused construction to be suspended for some years, so rails did not reach Churchill until the 29th March 1929.

During the early life of the Hudson Bay Railway some regarded it as a "white elephant"; results have shown otherwise — during the 1959 shipping season 21,787,125 bushels of grain were exported through Churchill. It has also done much to assist in the development of mines — four branch lines have been constructed to properties which have been or will shortly be brought into production.

In 1928, 88 miles were built to serve the Hudson Bay Mining and Smelting Company Limited at Flin Flon, now a city of over 10,000. During the same period, construction was carried out from near Cranberry Portage for 42 miles to Sherritt-Gordon Limited at Sherridon; this line was extended in 1953 a distance of 144 miles to Lynn Lake; the mine there supports a population of 2,500.

When the International Nickel Company decided in 1956 to bring its Mystery-Moak Lake properties into production, it was necessary to construct 31 miles of railway to the "Inco" mine at Thompson. The town-site there is planned for a population of up to 8,000.

Fifty miles to the north, a spur of 14 miles was built to deliver heavy equipment to Kelsey Generating Station being developed by the Manitoba Hydro-Electric Board at Grand Rapid on the Nelson River to supply power to the Thompson area.

Presently under construction is a branch line, 52 miles long, from Optic Lake, near Cranberry Portage, to serve the Hudson Bay Mining and Smelting Company's mines in the Snow Lake area; they will support a very nice little town there.

At Ilford, on the Hudson Bay Railway, freight is transferred, each winter, for haul by tractors to the God's Lake Field.

Nickel concentrates from the mine at Rankin Inlet are shipped by sea 280 miles south to Churchill and then forwarded by rail to the reduction plant.

Natives reap a seasonal harvest by hunting white whales and selling them to the processing plant at Churchill. Sportsmen seeking something different may enjoy a thrill, standing up in the bow of a canoe powered by a fast outboard motor, to harpoon these mammals.

It would appear that Churchill proved to be of considerable value in relation to National Defence during World War II, and since then as an Arctic testing ground.

*The Skeena River at Terrace, British Columbia, was the first obstacle to be overcome in location and construction of the railway to Kitimat. This unusual alignment for a bridge was necessary to obtain foundations on solid rock.* C.N.R.

*At Port Arthur, Ontario, train loads of iron ore are transferred by gravity through a pocket-dock to lake boats. The deck of this dock is 82 feet above water level.* C.N.R.

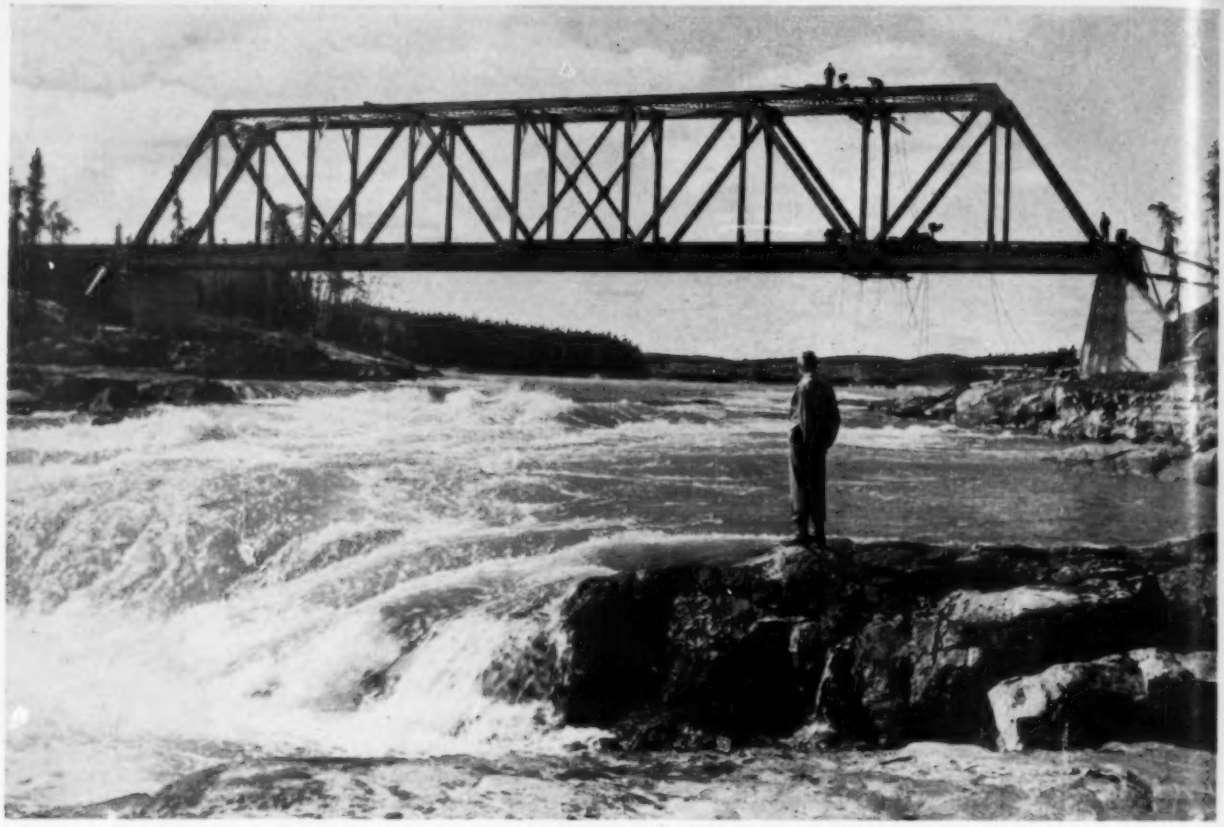
Other railways which have participated in developing the "North" are:—

*Ontario Northland Railway:*—This property is owned and operated by the Province of Ontario; the main tracks amount to 567 miles. Construction was carried out from North Bay as far as Cochrane, to effect a junction with the National Trans-continental (C.N.R.) in 1908, and during the period 1921-32, the line was extended to Moosonee, on James Bay. It has opened up the rich mining fields of Kirkland Lake, Noranda and Timmins and is continuing to play an important part in the expansion of mining and production from the forests and local agriculture.

*Northern Alberta Railways:*—Construction of these lines was commenced near Edmonton in 1912, by private interests; they were taken over by the Province of Alberta and subsequently by the Canadian National Railways and the Canadian Pacific Railway jointly; they now total 920 miles. The main line runs through rich agricultural and timber lands, by Lesser Slave Lake to Grand Prairie and the Peace River Country, terminating at Dawson Creek, British Columbia. A branch line runs to Waterways, on the Athabasca River, where goods are transferred to tugs and barges for transport by the great inland waterway which extends for 1,800 miles down to the Arctic.

Consideration is presently being given to extend the Northern Alberta Railways a distance of about 400 miles to a railhead on the south shore of Great Slave Lake. This would eliminate the necessity of navigating the shallow reaches on the Athabasca River between Fort McMurray and the Lake, and of portaging around rapids on the Slave River, for freight to Great Slave Lake and northerly points. In general, it would assist expansion of industries — agriculture, lumbering, mining and fishing.

The great potential source of minerals — the Canadian Shield — extends westerly to near the Athabasca River and along this river



*On the line to Lynn Lake, three channels of the Churchill River had to be crossed. The bridge over the north channel is shown nearing completion.* C.N.R.

tar sands are exposed; they are said to hold one of the world's largest untapped reservoirs of petroleum.

Pine Point Mines, a proven deposit of lead-zinc ore awaiting heavy transportation facilities, is located 10 miles south of Great Slave Lake. The gold mining town of Yellowknife is on the north shore and there are reports of many prospective properties in the area about this vast inland body of water.

In Wood Buffalo Park, a large tract west of Lake Athabasca and across the Peace River to north of Fort Smith, magnificent herds of buffalo range in a wild state. In general, buffalo were looked upon as native to the open prairies; however, "Wood Buffalo" were observed by the early fur-traders far to the north. Another feature within the "Park" is the nesting ground of the almost extinct whooping cranes.

Further to the west, around Fort Vermilion on the Peace River, there are extensive agricultural settlements and potential farm lands extend northerly to Upper Hay River.

*Pacific Great Eastern Railway:*—This line is owned and operated by the Province of British Columbia. It extends from North Vancouver for 729 miles to Fort St. John with a branch 62 miles to Dawson Creek to connect with the Northern Alberta Railways and fulfilled, in 1958, the long sought request by residents of the "Peace River Country" for direct rail service, particularly for export grain, to Pacific ports.

This scenic railway serves mines between Squamish and Lillooet, the extensive cattle ranges around Williams Lake and the lumber industry tributary to Prince George and northerly to the valley of the Peace River. Fort St. John is the centre of first class agricultural lands and of a number of natural gas wells; it is also a station for transfer of freight destined for Alaska from rail to highway transport.

During 1959, preliminary surveys were carried out on behalf of the Swedish industrialist, Wenner-Gren, for a railway to turn off from the Pacific Great Eastern just north of Prince George to provide transportation to stimulate development of natural resources

*Mannix Company drilling rock on the Optic Lake-Chisel Lake line in September 1958.* C.N.R.

in Northern British Columbia and to be so located that it could be extended through Yukon Territory to Alaska, a total distance of approximately 1400 miles. A glance at a map of North America shows how this proposed project would fit into an overall plan for direct railway transportation between Pacific coast industrial cities and the Alaskan Railway, operated by the United States Government, between Anchorage and Fairbanks.

One of the major controlling features is the Grand Canyon of the Stikine, together with the confluence of the Tanzilla River and the Tuya River with the Stikine River; it is a mighty awesome gorge. Here the Stikine flows a tortuous course between walls of the canyon, over 1,000 feet high, for a distance of nearly fifty miles. Railway construction to cross this canyon, or through it, would be extremely costly and therefore it would appear improbable that there will be a main north-south route located much west of the airfield at the south end of Dease Lake.

*On location survey in heavy timber, a "window" to sight through may be cut in the side of a large tree to avoid having to fell it.* C.N.R.

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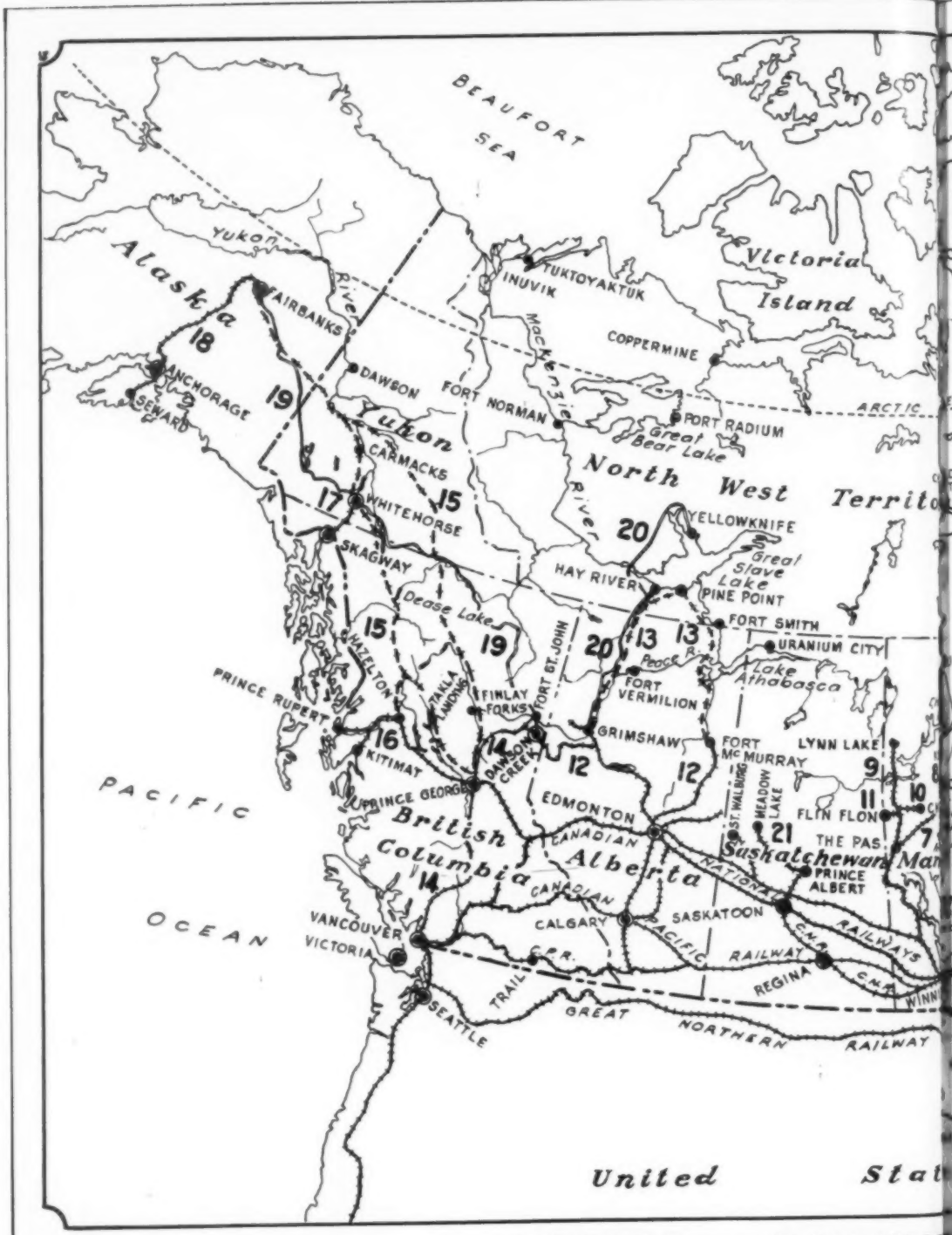
BEAUFORT SEA
Alaska
Yukon River
FAIRBANKS
INUVIK
TUKTOYAKTUK
Victoria Island
COPPERMINE
ANCHORAGE
SEWARD
DAWSON
FORT NORMAN
Mackenzie River
PORT RADIUM
Great Bear Lake
ARCTIC
Yukon
CARMACKS
WHITEHORSE
North West Territo
YELLOWKNIFE
SKAGWAY
HAY RIVER
Great Slave Lake
PINE POINT
Dease Lake
FORT SMITH
URANIUM CITY
WATSON LAKE
FORT ST. JOHN
Peace R.
Lake Athabasca
PRINCE RUPERT
TELEGRAPH CREEK
FINLAY FORKS
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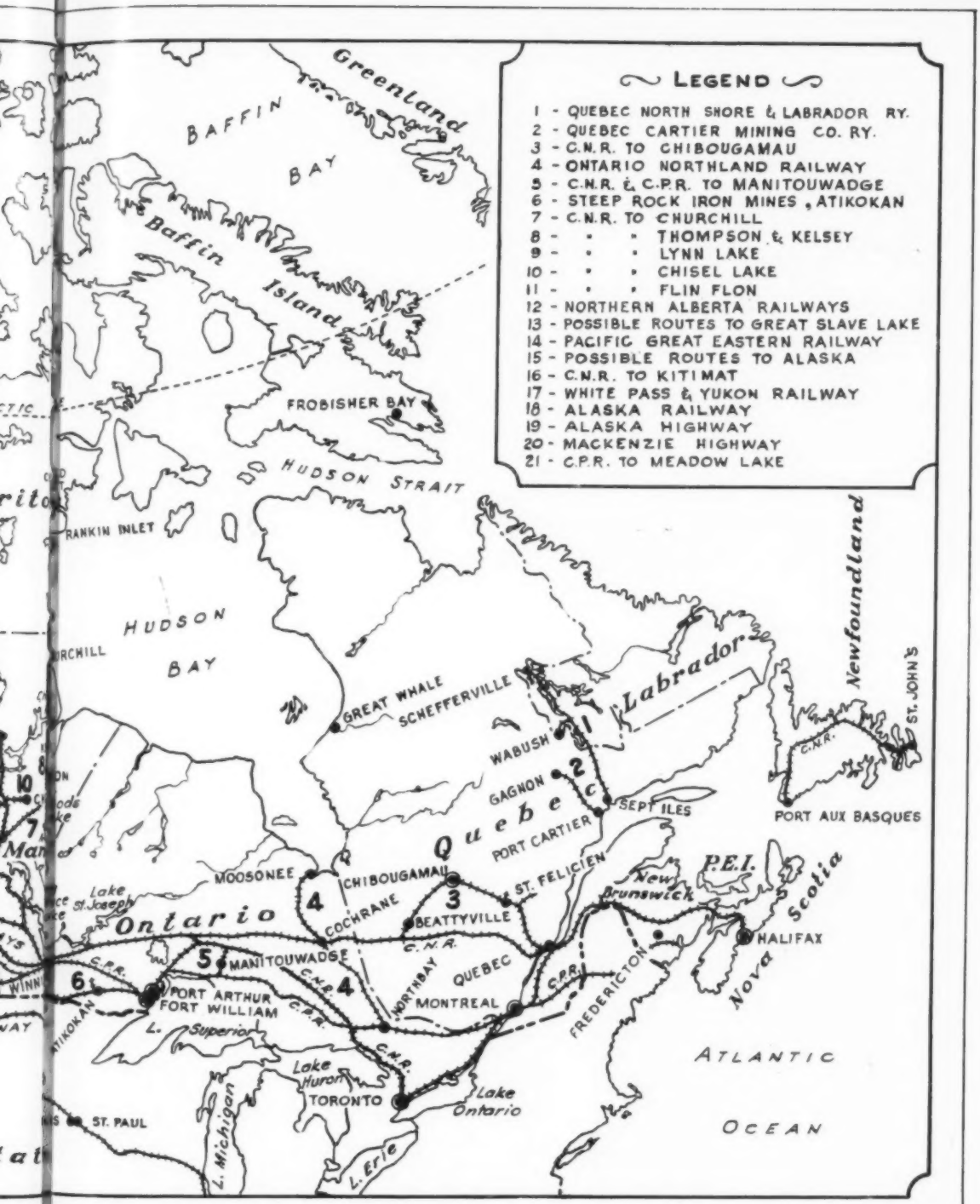


MARCH NORTHWARD

*The open pit mine of the Steep Rock Iron Mines at Atikokan, Ontario. Note the railway loading facilities, upper centre.* Hunting Survey Corporation

New Hazelton, latitude 55°25′, being the most northerly point on the Canadian National Railways west of Edmonton presents a possible alternative turnoff point to be considered for a railway to serve the North and on to Alaska; especially so when it is considered that a junction near Hazelton would be in a strategic position in relation to both the port of Prince Rupert and the hub city of Prince George.

*The White Pass and Yukon Railway:*— Another interesting feature in connection with development of the northwest is The White Pass and Yukon Railway, a narrow gauge line constructed during the height of the Klondyke gold rush to provide transportation from tidewater, at Skagway, over The White Pass, to connect with river transport on the Yukon River below Miles Canyon and Whitehorse Rapids. This railway is still an important link in handling heavy freight between west coast ports and Whitehorse, particularly in connection with mines at Mayo, Keno Hill and Cassiar Asbestos, and more recently with the Eagle Plains, where drilling for oil and gas is now active.

Recent developments in the east have also called for heavy transportation:—

*Quebec North Shore and Labrador Railway:*— When the Iron Ore Company of Canada decided to bring its mines near Knob Lake

*Saturated fine-grained clay is very difficult to excavate and handle; where timber is available, corduroy is helpful. In comparison, solid rock requires blasting but it is stable.* C.N.R.

XUM

*The Peace River and geological formations in its valley are major features to be considered in studies for a railway location to Great Slave Lake. This 'fold' is near Peace Point.*

into production construction of a railway to the St. Lawrence River became essential. A subsidiary, the Q.N.S. & L. Railway, was set-up to construct and operate a line, 358 miles, from Seven Islands to Schefferville; track was laid to this terminus 13th February 1954. A branch line, 42 miles, has been constructed to Wabush Lake.

This independent railway was designed and built to very high standards. Diesel-electric locomotives operated in multiples of four haul 125 loaded cars, approximately 14,000 tons, to deep water docks on the St. Lawrence.

*Quebec Cartier Mining Company:*—At Shelter Bay, 30 miles west of Seven Islands, another harbour and shipping facilities are being built in connection with the marketing of iron ore and a railway, 195 miles, is progressing to Lac Jeannine. Continuing exploration may result in trackage to be required for some distance further down north.

*Canadian National Railways:*—The spectacular open pit mines developed by Steep Rock Iron Mines and Caland Ore Company near Atikokan, Ontario, are served by comparatively short lines, constructed by our national railway through very rugged terrain, to haul ore from these mines to the Head of the Great Lakes.

In Quebec, it undertook to construct 295 miles of track to stimulate mining, lumbering and the general economic growth of the Chibougamau country. Relative to this, at Mattagami Lake a large deposit of zinc-bearing ore is being developed.

At Manitouwadge, Ontario, the Canadian National Railways and the Canadian Pacific Railway each constructed a line to serve the mines there.

The foregoing general summary of the parent main lines and branches towards the North, and also of lines projected for proposed construction, clearly demonstrates the vital importance of railways with respect to the

*Completing a deep cut in solid rock, a comparatively straight forward job.* C.N.R.

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*The late Captain J. E. Tait, V.C., M.C., wading along a survey line in northern Manitoba, 1913.*

*Pack horses on survey towards the Peace River country, 1911.*

economic growth of industries and relative population in our Northland.

**Early Survey Procedure**

Railway reconnaissance and location present a challenge to engineers willing to give up much — home life and comforts — for the privilege of taking part in the wide field of development; and, as life advances, to reap reward from seeing farms, lumber mills, mines and other industries, together with thriving communities, spring up in unsettled spaces. For engineers to be a success in this, it is essential for them to have natural aptitude and to be forever curious to discover what may be around the next bend of the river or over the next range of mountains.

Few maps and only sparse information were available to the early pathfinders; they set out by saddle-horse, canoe, dog team or on foot, as practicable with respect to the territory and the season. Rations were restricted by the means of transport and to items which would not be spoiled by summer heat or winter frost during long periods away from a base. Instruments used were compass, aneroid barometer, transit, level and chain.

After completion of the Canadian Pacific Railway main line, access to bases for surveys became less of a problem; however there were many distant territories to be opened up. Thousands of miles of railways were located and constructed during the periods of rapid expansion prior to 1930.

The story of the survey party engaged in 1910 on location for the Grand Trunk Pacific branch line between Tofield and Calgary illustrates well this important aspect of railway pioneering. Transport was by wagons and horses. In Spring the wide open ranges of rolling hills and many small lakes were indeed beautiful, prairie crocuses bloomed, ruffed grouse could be heard drumming in poplar bluffs, and, on nearby knolls, prairie chickens performed their mating dances. Ducks and other migratory birds were plentiful. To a young chainman, new to these parts, this was all a virtual paradise. Years later he had the pleasure of a reunion with the cook, who recalled happy days and laughing heartily said, "I used to deliberately put food in front of you to see just how much you could eat".

*A york boat enjoying a fair wind on the Nelson River, 1913.*

This party's next assignment was a winter one, in the foothills of the Rockies on a line to the coal fields southwest of Edson and following the "break-up", 1911, work was northerly to the Athabasca River towards Grand Prairie, with pack horses.

In September another move took this party to the Grand Trunk Pacific main line. The personnel detrained at the end of steel east of Jasper, walked through the Yellowhead Pass to Tete Jaune Cache on the Fraser River, commenced to survey westerly and built scows to move camp and supplies forward until freeze-up; then native birch was whittled to build hand sleighs, which were pulled over deep wet snow until Spring 1912. During break-up, canoes were carved from cottonwood logs for further travel down river until location was completed and the party assigned to construction, near the Grand Canyon east of Prince George. By this time the tents were full of spark holes and in otherwise poor condition, so a log camp was built with materials at hand; cedar was split for roof shakes, door and window frames.

Early in 1913, one instrumentman was returned to location surveys far away. After

*When there was no fair wind, york boats were rowed. A Hudson's Bay Company crew freighting supplies for survey party on the Nelson River between Norway House and Split Lake, 1913.*

*A survey party visiting a Cree trapper's winter quarters about Christmas, 1913. The women are baking bannock by an open fire-place. Cabins heated by open fire-places were better ventilated and healthier than present-day air-tight shacks.*

a walk to the end of steel, where Red Pass Junction is today, and a train journey to Winnipeg, he was assigned to a party being organized to survey the proposed railway to Hudson Bay.

On a fine morning in May the new party proceeded to Selkirk to load gear and supplies aboard the S.S. *Wolverine*. This took some time as the Merchants Hotel is conveniently close to the dock and, knowing it would be long before they would return to a source of refreshments, intimate persuasion was necessary to convince some that the time to embark had finally arrived. The sun was setting on the Red River as course was set for the head of Lake Winnipeg; this voyage was not without incident. North of Hecla, ice was encountered; it gouged through the bow of the boat. With no land in sight, the situation looked cheerless; but a dark-skinned canoeman, who had out manoeuvred his wife in a foot race around cord wood piles on Selkirk dock and succeeded in taking his last bottle aboard, was still happy and exclaimed to a fellow passenger, a missionary, "There's a hole in the butt (boat) — pray".

From Norway House, travel was by paddling — two or three men to each canoe, with their proportion of equipment and supplies to last many months. Work was commenced where the railway was projected to cross the Nelson River at Manitou Rapids. Unfortunately, one canoe was swamped by a whirlpool and a man, although a strong swimmer, was drowned. By fall the line had been run to Kettle Rapids. After freeze-up dogs were obtained for transport until spring, when open water again permitted use of canoes. The survey was completed to the Bay in August 1914. News of war was heard from an ocean ship and the party returned to Winnipeg by canoe upstream by the Nelson River and lakes, a distance of 700 miles.

During the sixteen months this party, 18 men, was in the field, without meeting others, excepting for a few trappers and one "Mountie", all worked with a splendid spirit of co-operation, and in good health, on a diet without fresh vegetables, fruit or eggs and not much fresh meat, though fish could be caught without difficulty. Bare tents, with spruce boughs to lie on, were comfortable and fragrant. Life was good. The job progressed a minimum of ten hours a day on line, six days a week, sometimes seven, summer and winter. Angles were measured, levels taken and distances chained accurately, amidst clouds of mosquitoes and black flies and also when temperatures dropped to 60 degrees below zero. After supper at least two hours were occupied to calculate and plot notes; during the long winter evenings "office" work was done by candlelight and sometimes by nothing better than a "bitch" — a wick in a shallow tin of tallow. There was no need for movies or T.V. to fill in time.

**Early Construction Methods—"On to The Bay"**

Grading was carried out almost entirely by hand. Drainage of the extensive muskegs was a major factor. Ditches were excavated through permafrost with shovels. When time was available, the frozen materials were taken out in layers about six inches deep as

*Stationmen building a grade from side borrow at Mile 330, Hudson Bay Railway, 1914. Note trestles and planks of native spruce.*

they thawed. Where it was essential to drain particular areas without delay, some offtakes were actually chopped out with axes.

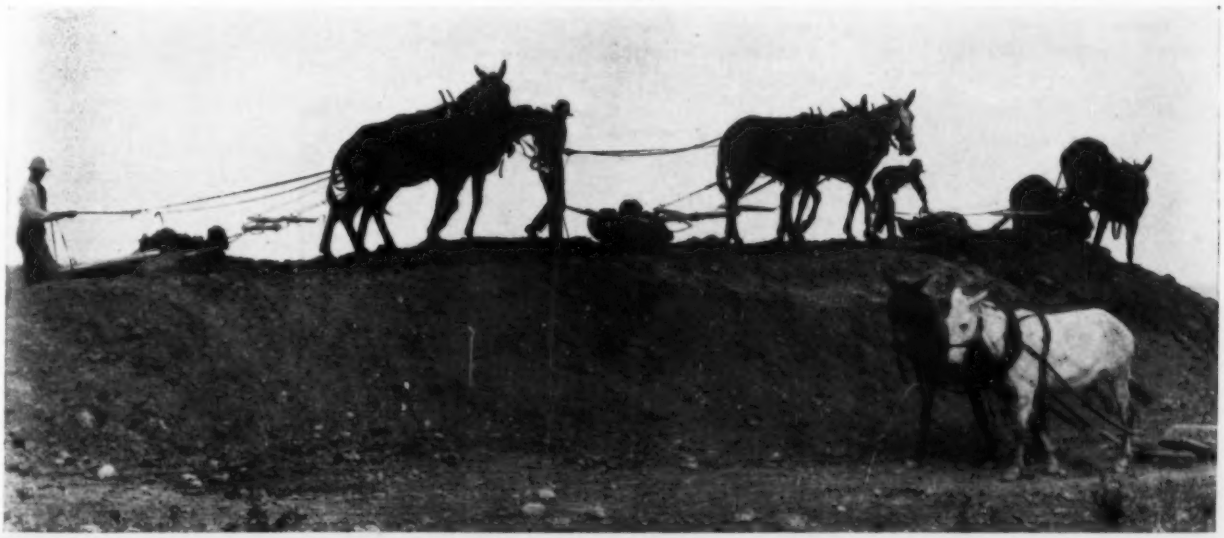
As much of the embankments crossed wide muskegs, they were built of organic materials excavated from side borrow pits. This type of work was carried out by small sub-contractors termed "station-men" — six to a dozen men would work together. The main contractor established caches of tools and supplies at intervals of ten miles along the line. Stocks were hauled in during the winter by teams over the frozen terrain; before spring break-up the teams were returned to the south.

During summer travel was on foot. The contractors' representatives were one "lone clerk" at each cache and a "walking boss" in charge of say fifty miles of work. Resident engineers, representing the railway, were also located at ten mile intervals. If the placing of any item was overlooked during the winter freighting, those concerned just had to do without or wait until the following freeze-up.

Mail was packed along the line once each month; heavy packages of newspapers might quite reasonably be ditched. One packer, "Big Bill McKechnie", "the human derrick", actually a man of light stature, was quite a character and, as he had a fund of stories, his arrival at camp was always welcome. He described the farm he grew up on as "so barren that crows became hump-backed packing lunches across it".

Each spring, "station-men" would walk forward from the end of steel distances up to 100 miles, packing their few belongings, to where work was available. At the nearest

*Grading with slip scrappers and mules, 1910. Slips were the forerunners of the modern scrappers in common use today.* C.N.R.



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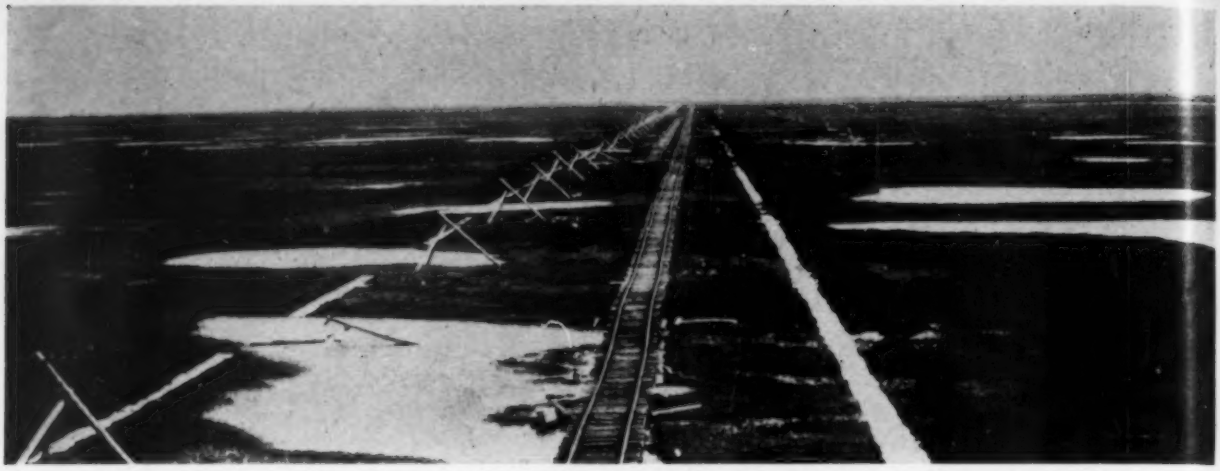

*Skeleton track across the "Barrens" to Churchill, spring 1929, before lifting by trainfilling with granular materials from pits established during previous winter. Built on permafrost, track was raised to be almost entirely on embankment; this and fact that permafrost condition has been retained keep maintenance to a minimum. Mounting telegraph line on tripods is most practical method for this territory.*

cache they were issued with axes, shovels, wheelbarrows in knock-down form, a few nails and groceries and sometimes a tin stove. From then it was up to each group to carry on; they packed their tools and supplies to the respective working sites, built a crude log shack, hewed logs to build trestles and planks on which to wheel materials from borrow pits to build embankments staked out by the engineers.

Where the line was through broken topography of the Canadian Shield rock cuts were drilled by teams of three men — one turning the steel and two striking with hammers — to prepare for blasting. The shot rock was then loaded by hand into small cars — consisting of a box made of hewn poles, mounted on axles and double flanged wheels — and pushed on tracks of poles to be dumped where required to build up adjacent embankments. At some of the larger cuts a team of horses would be left in after winter freighting, but this was not common as cost of feed came high so far from farms.

Track was laid during winter when the grade was frozen. The roadbed was consolidated with trainfill and ballast during summer. Rails were laid to Mile 332, just north of Kettle Rapids, before construction was suspended on account of war conditions.

*Final Survey to Churchill:*—When it was decided that this project should be completed, the first step was to run a preliminary survey beyond the end of steel. Setting out with two Indians and dog teams in January 1927 the reconnaissance engineer, on snowshoes, broke trail ahead with the aid of a small pocket compass and by early in March had selected the general route through to Churchill. No persons, not even Indians, were met along the way. At the port there were five white persons — the Anglican missionary and his wife and three at the Hudson's Bay Company post; they had not seen outsiders

*Construction on the Hudson Bay Railway, 1914. Materials from cuts were pushed by stationmen in car over track of poles to build adjacent embankments. The stationmen's shack is to the left.*

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since the annual summer visit of the ship *Nascopie*.

During the summer, harbour engineers made field studies of the mouth of the Churchill River with respect to conditions there and what works would be necessary to develop facilities to accommodate ocean vessels. By "fall" sufficient data had been submitted to establish this site to be the most practical terminus of the railway.

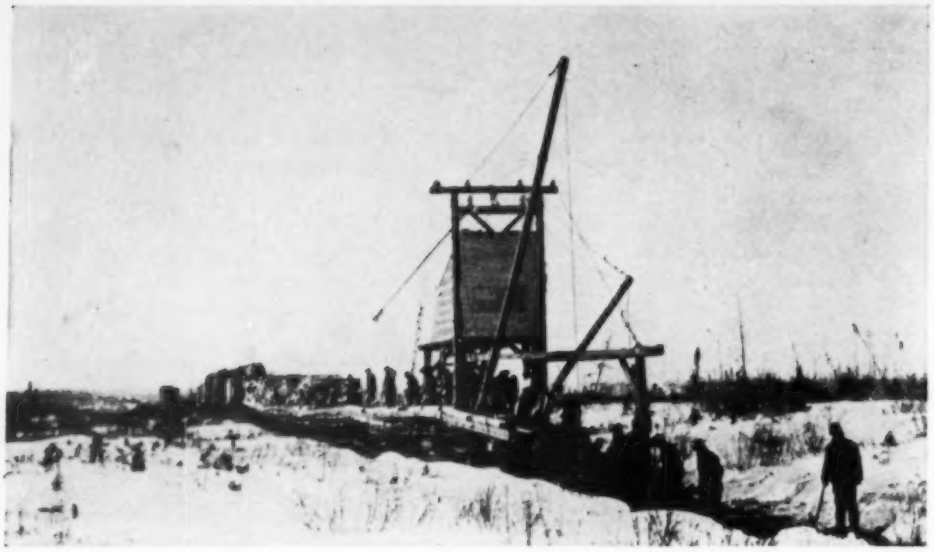
In September, the reconnaissance engineer was instructed to review the controlling features of the railway route under summer conditions. This was done on foot with one assistant and two Indians. Only the bare necessities were packed — bacon, flour, oatmeal, tea, etc., — no tents. There was no time to supplement the diet with fish or game. Through the extensive areas of muskeg it was impracticable to endeavour to keep dry below the waist; a pair of new, strong-quality, boots was completely worn out within three weeks by constant wetting and at each step pulling them up through the fibrous carpet.

On returning to headquarters immediate action was taken to organize a strong party to run a final location for the railway. Sixty dogs were purchased from Lake Winnipeg fishermen and crated. They were then trucked to Winnipeg; there was much howling, particularly along Main Street to the C.N.R. Station. Shipment was then by rail to the end of steel, together with supplies for twenty men and dog food, sufficient to support this party throughout the winter; this included a special Christmas dinner, with a gallon jar of rum, which was enjoyed just south of the "Barrens". Before spring break-up, 1928, the line was staked into Churchill.

*Approaching Churchill, Permafrost is Extensive:*—Materials and equipment for bridges and culverts were hauled forward by teams over the frozen terrain as the location survey proceeded. Limited grading was carried out and skeleton track was mostly laid on frozen muskeg. Steel rails and fastenings were handled on the "Barren Lands" when temperatures dropped to 50 degrees below zero. "Wind-chill" charts had not been devised. During the same winter tracks were laid into three large gravel deposits. Before spring break-up steam shovels, locomotives, cars, fuels and supplies were placed at each prospective ballast pit. As soon as weather conditions permitted, gravel was excavated and distributed outward from each pit, so that tracks could be lifted with trainfill and ballast progressively to the main line; thence, north and south until connections were made with lifting being carried out simultaneously from similar operations from the north and the south. After progressive lifts the completed main track was supported almost entirely on embankments of granular materials.

The latitude of Churchill is 58°47′; although this is not far north in comparison with establishments on the "DEW" line and other points in the Arctic, it is the most northerly railway station with direct connection to the general rail system of North America. Therefore, the Hudson Bay Railway — recently taken into the Canadian National Railways — with the comfort of sleeping and dining

*Stationmen excavating by hand cut of hardpan and boulders on Hudson Bay Railway, 1914. Note the rails (jack-pine poles protected with band iron) and car made of hewn logs, mounted on double flanged wheels.*



*Tracklaying on permafrost without advance grading through the "land of little sticks" for the Hudson Bay Railway, winter of 1928-29.*

cars, presents unusual opportunities for the study of construction, maintenance and operation in the sub-arctic.

In fact, conditions encountered on the northerly section of this line are similar to those to be expected beyond to the Arctic Circle. Minimum temperatures are not lower than at some stations on the transcontinental lines. A marked difference is the increased effect of wind in the open and the longer winter season. North of Gillam, Mile 326, snowfall is not deep; heavy ground drifts occur but as the roadbed is almost entirely on embankments, 3 to 5 feet in height, drifts seldom accumulate on the track. During some winters it is not necessary to operate a snow-plow.

The northerly section of this railway has now been in operation for thirty years. As it is constructed almost entirely on muskeg underlaid by permafrost, at some points to a depth of nearly 200 feet, maintenance of good track surface is not difficult. On account of long winters and light precipitation life of structural timber is comparatively long. Treated track ties are expected to have a life of fifty or more years. However, deep frost does cause a very irregular pattern of heaving to piles in some timber bridges but this is overcome by re-surfacing the deck as may be necessary.

The tundra south of Churchill, locally known as the "Barren Lands" and "Land of Little Sticks" is illustrative of the type of country most conducive to the occurrence of permafrost. The average yearly air temperature is 19°F. The area, in general, is flat — an elevation of 50 to 200 feet above sea level. There are numerous shallow lakes and ponds and between them are muskeg hummocks of 5 to 10 feet in height. The entire ground area is covered with a heavy vegetation of mosses; under them are organic materials and then glacial drift. Lenses of clear blue ice are found in both organic materials and drift. On higher ground — hummocks — the active layer only thaws to a depth of from 12 to 18 inches below the surface, whereas, in lower ground — hollows — where water accumulates in summer, the seasonal thaw may be much deeper.

Observation of thaw at the banks of the shallow lakes and ponds in contact with water and wave action, which causes periodical overhang and cave-ins, may in time increase the water surfaces and tend to join them together; then, heavier run-off may deepen water courses to improve drainage and transform soil conditions to a more advanced state which could encourage growth of timber, such as the fair stands of spruce presently found on islands and river banks where there is good drainage.

During excavation for ballast, Walrus skulls and tusks were uncovered at a location 215 feet above, and 50 miles inland from, the present shoreline of Hudson Bay. It would appear that the "Lowlands" may continue to rise slowly above sea level and assist in the evolution of this region.

Southerly, in the territory between Gillam and Ilford, the condition of permafrost de-

creases and occurs in the form of large "islands". Smaller "islands" or "patches" of permafrost are found as far south as Wabowden, latitude 54°40′, with an average yearly air temperature of 28°F. This and other observations indicate that, with local vagaries excepted, permafrost may be expected in regions where the annual mean temperature is a few degrees below freezing — say 25°F.

Much of Canada is north of isotherm 25°, therefore the importance of ascertaining the occurrence of this condition and studying it, in relation to construction and maintenance, can hardly be over-emphasized.

### Now Aircraft And Photogrammetry Facilitate Surveys

Railway surveys were conducted in much the same manner as employed by the pioneer engineers until aircraft became generally available for transportation and observation in connection with such projects.

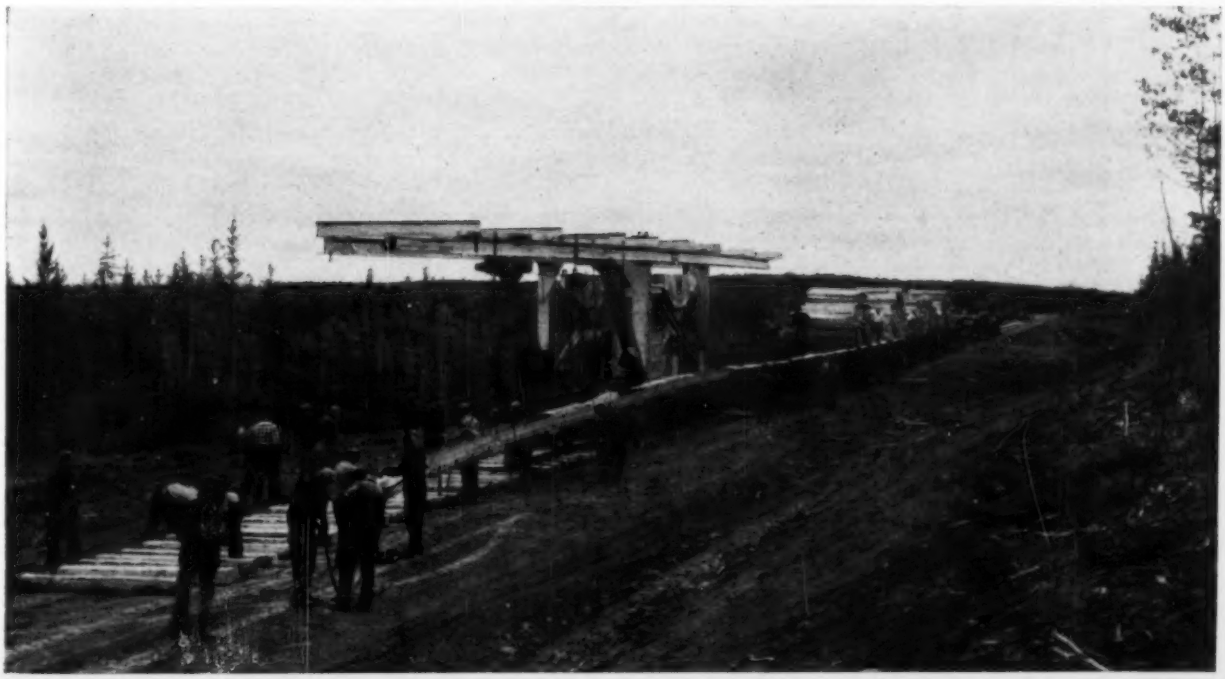
During 1942, under the stress of war, an outstanding feat was accomplished by Army Engineers, United States and Canadian together, with the aid of aircraft for transportation, reconnaissance and photography. A preliminary location was staked for a military railway from Prince George, British Columbia, via the Rocky Mountain Trench, to Alaska — close on 1500 miles — within five months.

As a result of the scientific advances made during World War II with respect to aerial photography, photogrammetry, photo interpretation and analysis, an experienced engineer is now able to view and evaluate wider areas and alternative routes within less time and the back-breaking toil previously essential to surveys has been reduced.

Recently, an extensive railway survey was undertaken using all facilities now available. This project was entirely through mountain territory, as yet in all its natural magnificence — a land to inspire all with soul to be free. Rainbow trout could be taken from the clear waters at any time they were fancied for the pan; moose browsed in the open swamps and pulled water-lily roots from ponds; on grassy meadows, at higher elevations, caribou were plentiful, as were goats on the crags. In early summer, grizzly bears ranged just below snowline, and in the fall, fished along the rivers and lakes for salmon. Beaver worked hard impounding water necessary to their way of life. A Canada goose built her nest, of down, on top of a beaver house, 3,850 feet above sea level; in June, ice and snow were nearby. Large flocks of great white swans rested on quiet waters, during their long flight southward, a few days before "freeze-up".

Amidst such grandeur it may be difficult to concentrate on ordinary tasks, but, reconnaissance is far from ordinary, it becomes all

*Modern model of pioneer laying track to Thompson, 1953.* C.N.R.



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*Churchill harbour is protected by a formation of barren windswept rock. Samuel Hearne, the famous explorer, left his name carved in the rock on the west shore. The Danish explorer, Jens Munck, wintered nearby during 1619.*

absorbing to overcome the obstacles of nature — swift rivers flowing through deep canyons, high summits between mountain ranges, muskegs and most treacherous of all, sidehills of sliding fine grained clay, spewing water. However, the engineer examined several routes from a light aircraft to select the most practical one and made a detailed study of it by helicopter, a distance of 960 miles, within three weeks when the hours of darkness are few.

Elevations of controlling features, particularly summits and river crossings, were obtained by readings from aneroid barometers and the distances between these points were estimated from general maps available, to establish rates of ruling gradients to be sought. Landings were made at many points to examine ground formation and conditions.

A strip along the route, generally one and a half miles wide, was then delineated by the reconnaissance engineer, on the respective maps, to be photographed from an elevation of 12,000 feet above the ground.

The next step was to establish basic ground control stations, together with the respective elevations and distances between them. This was carried out by triangulation and barometer readings. Angles, horizontal and vertical, were measured with transits and distances with electronic instruments. Two small parties of surveyors, each with one plane and one helicopter, carried out this phase of the project.

As ground controls and aerial photographs were developed progressively, the reconnaissance engineer studied the photographs in stereo pairs and delineated on them a strip, varying from 1,000 feet to 5,000 feet wide to be mapped. Maps, scale one inch to 400 feet, contours 10 foot vertical interval, were plotted by two companies, specialists in photogrammetry.

When the contour maps were delivered, the reconnaissance engineer projected a centre line for the proposed railway location on the respective maps. Associate engineers then plotted the relative profile and prepared estimates of approximate quantities and costs for clearing, grading, bridging and tracks, etc., which would be required to construct 697 miles of main line. This, together with general reconnaissance for a possible extension of another 700 miles, was all completed within one season, six months, by a civilian organization, without extensive resources available to the military.

However, prudence should be exercised to co-ordinate aerial methods with careful examination on the ground of all controlling

features, to confirm photo interpretation and to guard against the possibility of serious omission.

Up-to-date maps, plotted from aerial photographs, show the amazing results the "old timers" achieved entirely on the ground. Engineers presently practicing, and in the future, will be well advised to study with deep reverence the early railway locations, which are such excellent examples of the "art".

### The North Calls

Canada's Northlands yet present a gigantic jig-saw puzzle, awaiting men and women prepared to take up the challenge of Robert Service's lines:—

"This is the law of the Yukon, that only the Strong shall thrive

That surely the Weak shall perish, and only the Fit survive.

Send me the best of your breeding, lend me your chosen ones;

Them will I take to my bosom, them I will call my sons;

Them will I gild with my treasure, them will I glut with my meat;

But the others — the misfits, the failures — I trample under my feet."

*A work train crossing a timber trestle over Alwyn Creek during construction between Terrace and Kitimat.* C.N.R.

*House boats and shikari on the canals of Srinagar, the Venice of Kashmir. The larger boats, at least 60 feet in length, provide complete living accommodation, and compare favourably with most hotels, with the added advantage of mobility.*

# Kashmir

*by* S. C. WILEY

Photographs by Major M. C. Buckwell except where credited.

ON THE other side of the world, Canada's troops are on patrol duty in Kashmir. As a segment of the United Nation's Security Council Military Observer group dispatched in 1948 to quell the discord between India and Pakistan over neighbouring Kashmir, Canadian soldiers help to supervise a cease-fire line. It is an arbitrary line which involves more trouble over animals straying across some unfenced portion of no man's land than a bloody struggle of armed conflict. The Kashmiris themselves are a very religious people, but paradoxically, their various religions have been a great source of friction. Over seventy-seven percent of the 4,500,000 population adhere to the Muslim belief, roughly twenty percent are Hindu and the remaining are divided among Sikhs, Buddhists, Jews and Christians. The greatest concentration of Hindus is found in the southern part of the country adjacent to India. Kashmir has split internally as the Hindu and Muslim factions are wont to ally themselves either with India or with Pakistan respectively.

Of additional import, under the Colombo Plan and other assistance pacts, Canada has allocated millions of dollars toward hydro-electric projects in both India and Pakistan over and above $22,100,000 donated toward development of the Indus Basin. Kashmir should rightfully share in these developments regardless of her political or spiritual affiliations since she is the main spawning ground for the water and power potential of the Indus.

Nominally, India administers nearly 55,000 square miles of Jammu and Kashmir proper, and the remaining area of 30,000 square miles is either Azad Kashmir (Free Kashmir), or is territory under the administration of Pakistan. Representatives from Kashmir sit regularly in the Indian Legislature. Many of the India-Pakistan border disputes, of which Kashmir is but one, have been resolved, and

the two countries have almost eradicated their financial problems arising out of partition. Frontier disputes concerning the eastern border of India-Pakistan have been settled by signed agreement. They have also acquiesced on the principles of an international water treaty to share the canal waters of the Indus Basin.

The provinces of Jammu and Kashmir and the Frontier Agencies, under the name Kashmir encompass 84,471 square miles of territory inclusive of mountains along their borders which are among the loftiest in the world. About four times the size of Nova Scotia, Kashmir is surrounded by Afganistan and Chinese Sinkiang on the north, Tibet on the east, India to the south and Pakistan to the west and northwest. It is a country of 40 cities and almost 9,000 villages, and although the average density of population is 55 per square mile, there is a great uneveness in distribution since the Province of Jammu alone has a population of more than 2,000,000 and the Vale of Kashmir approximately 1,800,000. In contrast, the Districts of Gilgit and Ladakh, which cover three-fourths of the surface area of Kashmir have a total population of less than 200,000.

Kashmir's greatest east to west extent exceeds 400 miles and its greatest latitudinal expanse is just over 300 miles, or roughly the distance between Ottawa and Toronto. Ottawa, at 75 degrees and 44′ west longitude is as far west of the Greenwich Prime Meridian (0°) as Kashmir's capital city of Srinagar is east of Greenwich at 74 degrees and 45′ east longitude, but the northernmost latitude of Kashmir would not reach Canada's southern border. The tallest peak in Canada, Mt. Logan at 19,850 feet, is a surprising 8,400 feet below the craggy apex of $K_2$ (Mt. Godwin Austen), in the high Karakorams of Kashmir, and some gorges of the great Indus River system are three times the depth of the Grand Canyon.

### Geographical Regions

In the southwest, the Pir Panjal Range rises above 15,000 feet to bisect the most productive areas of Kashmir into the Jhelum Basin to the north and east and into the Jammu Plains area south and west of the mountains. The Vale of Kashmir is the most significant part of the Jhelum Valley, containing two-thirds of the total population of the state, the most important agricultural areas and most of the economic activities. The basin of the Jhelum River averages 5,600 feet above sea level, is surrounded on the north and east by the ranges of the Great Himalayas (20,000 ft.) and is encompassed on the opposite side by the Pir Panjal. Between the foothills of these cordilleras, the basin narrows to twenty miles in places but in its longest extent reaches 100 miles. The area receives a scant 27 inches of annual rainfall, and cultivation depends upon irrigation to supplement the lack of periodic precipitation. Relative humidity is constantly high, rarely falling lower than 70 percent and the July mean temperature of 73 degrees F. (Toronto 70°F.) is warm. The January mean is 31 degrees F. (Vancouver 33°F.) and the winter precipitation maximum falls mainly as snow. Srinagar, with a population of 225,000 is the

*A common sight in West Kashmir are the snowy peaks of the Pir Panjal Mountains, one of the lower ranges of the Himalayas. The Kishinganga River rushes by in the foreground.*

chief city and summer capital and is noted mainly for its houseboats, canals and seven wooden bridges.

To the south and west of Pir Panjal, the Jammu Plains and submontane foothills range from 1,100 to 4,000 feet in elevation. The waning influence of the southeast monsoon strikes the area about mid-July but May and June are the hottest months of the year. It is much warmer throughout this region than in most other areas of Kashmir and the mean maximum temperatures at Jammu for May and June run well over 100 degrees F. The annual rainfall is supplemented during the monsoon season between July and September to give an average of 37 inches. The plains and submontane district of the Punjab are very important contributors to the overall agricultural picture. Here the chief river is the Chenab, and Jammu, with 60,000 population, is famous as the winter capital.

To the north and east of the Jhelum Basin lie the Tibetan and semi-Tibetan tracts which include the highly elevated districts of Ladakh and Gilgit and the region of Baltistan. It is a region of sparse population between the elevations of 9,000 and 12,000 feet where some subsistence agriculture is possible with irrigation, but above 12,000 feet, except for pastoral activities, agriculture is precluded and the population is practically nil. The climate here is continental because of proximity to the Asian land mass and the generally excessive altitude. The mean January temperature at Leh is 17 degrees F. (Calgary 15°F.), rising to a July mean of 63 degrees F. (Calgary 62°F.). Calgary's mean annual temperature is 38 degrees F. and that of Leh (11,400 ft.) is 41 degrees F. Natives of the area can look forward to low winter temperatures, warm summers, and a very small annual rainfall, most of which falls in July and

*Muzaffarabad, the capital of Azad Kashmir, is situated at the branch of the Kishinganga and Jhelum Rivers. The Kishinganga River is in the foreground.* Pakistan Government

August. The air is usually dry and bracing with relative humidity of 40 percent or lower from May to November. The tops of the surrounding mountains which reach above 25,000 feet receive heavy annual snowfalls and add to the numerous transversal and longitudinal glaciers. The Hunza Valley glaciers are among the largest in the world and in some instances, descend to the levels of cultivated fields at 7,000 or 8,000 feet. The high peak of Nanga Parbat (26,660 ft.) lies on the western border of this division and $K_2$ (Mt. Godwin Austen at 28,250 ft.) lies far to the east in what is known as the "indefinite border zone".

The semi-Tibetan tract embraces Astor with some parts of Gilgit and Baltistan. Here again, the hillsides are almost barren and little can be cultivated without irrigation. Rainfall varies between five and six inches and there is considerable snowfall on the mountain crests which becomes of great value to irrigation with the spring snow melt. The transition periods of spring and autumn are mild, but the winters are bitterly cold and the summers at the bottom of the valleys quite warm.

Kashmir then, is almost entirely mountainous except for the Vale of Kashmir and the narrow belt of rolling land which lies contiguous with the Punjab. The high mountain ranges trending in a NW-SE direction are extremely important to the moisture and humidity regimes since moisture-bearing winds from both east and west obtain access to the valleys through the mountain passes



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and often travel for some distance. As they continue their journey, they also rise and collect whatever moisture is available from the mountainsides, finally depositing their collection in the more fortunate valleys.

The three main mountain ranges are parallel and from the lowest to the highest are the Pir Panjal, the Great Himalayas and the Karakorams. Much of present Kashmir was once beneath an inland sea and zones of interior drainage with brackish lakes still exist. Many of the high ranges of the Karakorams are largely unexplored but in the last few years modern surveys have been undertaken. It is reported that anthracite coal seams of twenty feet thickness have been uncovered, but the present state of mineral exploitation hinges on very small scale extraction of coal, iron ore, bauxite, indianite, slate, limestone and sapphires.

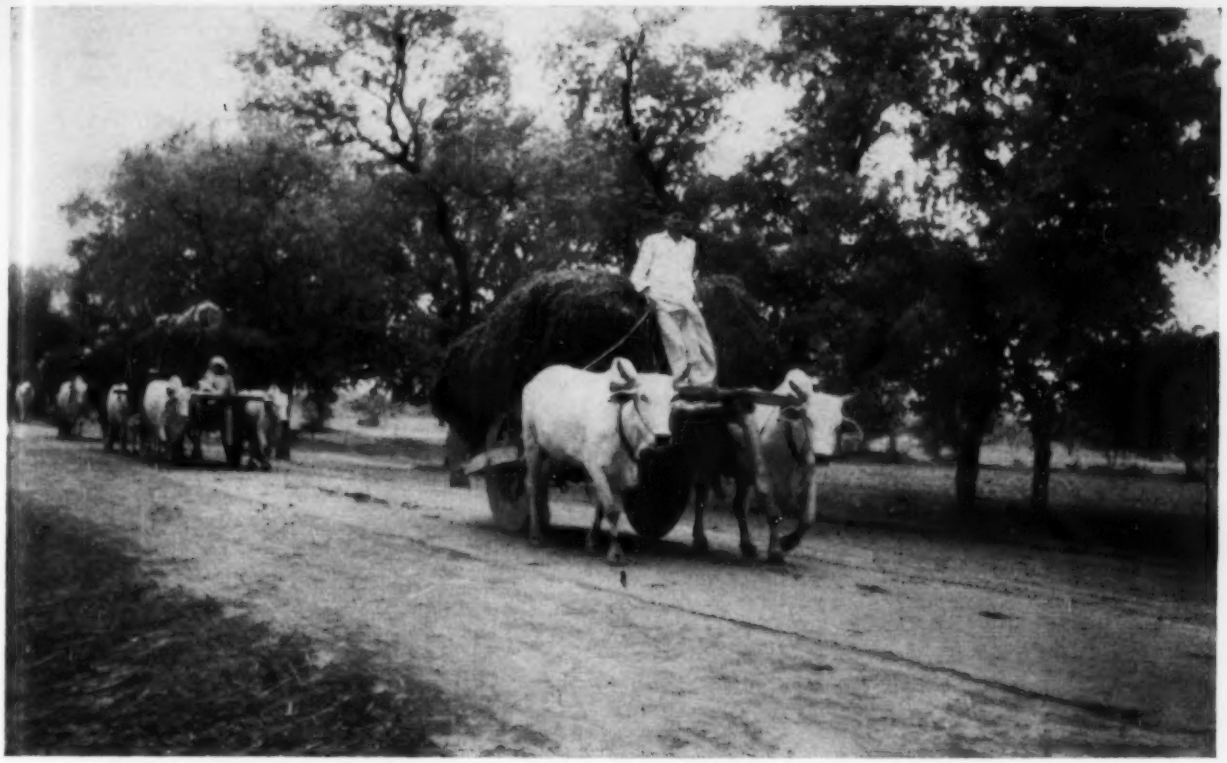
If the mountain structure so profoundly affects the climate, it has equally influenced transportation and cross-country travel. Many are so high that snow and ice effectively blocks passage over or around them for many months of the year. The passes of the Karakorams are among the highest in the world, some of which are more than four miles above sea level. There are many intra-regional passes which aid movement within Kashmir proper and which are no less essential to cross-country movement.

These difficult lines of communication have severely restricted trade and development. Between Srinagar, the summer capital, and Jammu, the winter capital, the 200 mile Banihal cart road now gives all weather connections via the recently opened Jawahar Tunnel at 7,250 feet elevation. All weather roads exist along the Jhelum Valley from Srinagar to Domel and Rawalpindi and from Srinagar through Baramula and the gorge of the Jhelum River to Abbottabad. A fair motor road connects Srinagar with the resort area of Gulmarg and the newly constructed motor-road opened between Jammu and Pathankot gives a linkage with the Indian Railways system. The only railroad is a 16-mile stretch running between Jammu and Sialkot, Pakistan.

There are then, less than 400 miles of roads which could be placed under the category of national highways but 16 miles of railway. Much or most of the cross-country travel by cart-roads or footpaths invites peril in narrow canyon defiles, along the sheer walls of valley gorges and across rock strewn plateaus. Stream crossings are an extra hazard because of precariously strung suspension bridges which sway with every step, and in some instances, the lashed-in planking or log may be more than a convenient step apart. Travel by donkey and horse can be extremely hazardous in and through the country of the gorges since much of the pathway is afforded by means of makeshift *paharis* or *rafiks*. The former are made of wood but the latter are very simply constructed by driving stone wedges into cracks along the face of steep cliffs and in mushroom fashion flat rocks are dovetailed above them with an interlacing of twigs and branches. Eventually, the platform protrudes far enough to allow limited passage. The *rafiks* are no more than calculated risks for these daring people, many of whom along with their animals lose their lives each year, because of the supporting wedges of the pathway becoming loosened from one force or another. Today, the aeroplane facilitates travel between a few points, as between the Srinagar airport and landing fields at Gilgit and Skardu.

### Economic Activity

Mountains have been of decided importance to the economic activities of Kashmir. Although there is little tree growth in the Alpine or Trans-Himalayan sub-region except dwarf species of shurbs and groves of cedar or willow, the more temperate climate below 10,000 feet produces extensive forests of deodar, oaks, yews, chinars and poplars. From 6,000 to 9,000 feet, the forests are rich with great stands of firs, blue pines and birches. Under government control, the forest industries have provided from one-third to one-half the total revenue of the state over many decades. The principal species of timber now being exploited are deodar, blue pine and fir which grow gregariously and are easily and economically rafted down the rivers to the Punjab or in extreme cases, to the port of Karachi. About one-eighth of Kashmir is forested. These forests are found in altitudinal belts rather than in a widespread distributional pattern.



*Two-wheeled cattle carts loaded with hay. The wheels are made entirely of wood, and apart from a few bolts, the only metal used is the steel axle. Normally, the cart weighs more than the load.*

As in many other countries, the forest wealth of Kashmir has been subjected to an increasing pressure of population with inevitable reckless tree-cutting and wanton destruction of stands. In the higher parts of the country, even firewood is at a premium and in some sections, dried animal dung replaces wood as a cooking and heating medium. Many hours of cooperative family efforts are expended in the daily search for firewood. Much of the commercial timber is used locally by numerous industries. In a normal year, between forty and forty-five million cubic feet of timber will be harvested and will be divided almost equally for purposes of lumber and fuel. Timber is Kashmir's principal export and alone accounts for 90 percent of the total amount by volume of products exported. Most of this is floated down the Indus, the Jhelum and the Chenab Rivers, and when the timber occasionally becomes beached along some of the more slowly moving stretches, it is gathered and auctioned on behalf of the state.

Silkworm breeding (sericulture) was first introduced into Kashmir in the 16th century. Since that time, thousands of mulberry trees and imported seed eggs have been distributed free of charge by the state and about one-twentieth of the annual budget is allocated to this industry. The climate of the southern foot-hills is particularly congenial for the breeding of silkworms and the silk business has flourished since its inception 600 years ago. Kashmiri silk with its special designs and even more renowned invisible stitching was patronized by fashionable ladies and nobles of the court. Today, it is one of the chief economic products with two crops annually from the "true mulberry zone" and at least one crop from the cooler mountain districts. Fortunately, the mulberry tree will grow well on the less fertile soils of the highlands which are often too sandy and acidic for other tree crops. The fruit is delicious if eaten fresh, but it can also be dried for preservation. Because of almost optimum conditions, the production of raw silk has become the second largest non-agricultural activity in the state and the silk factory at Srinagar is reputed to be the largest in the world. The mulberry tree has played a double role providing large revenues to the state while simultaneously augmenting the local food supply.



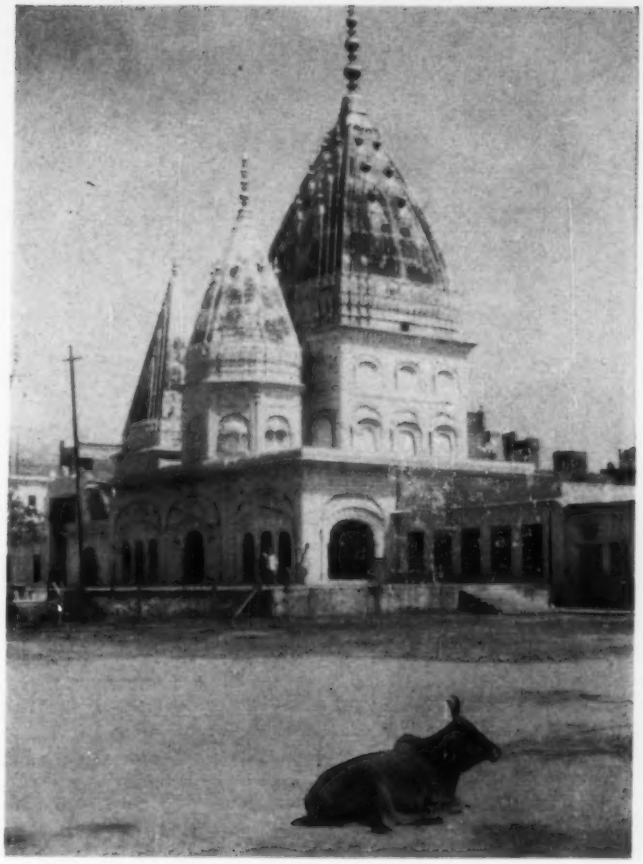
XUM

*The bazaar in Srinigar. The ground floor of the buildings is given over to the shops, with work rooms in the rear, and living quarters upstairs. The owner usually manufactures his own wares. The roadway on the left is tarred, and except in wet weather, the clay surface on the right is equally as hard.*

Among the new industries which have appeared in recent years are the manufacture of matches at Baramula and the manufacture of willow goods in the form of chairs, sofas, teapoys, baskets, vases, trays and several types of sporting goods. Some attempts have been made in Hunza and other areas to interest people in woodcarving and allied crafts using the remains of apricot trees which had supplied them with tasty fruits for fifty years before they succumbed to exhaustion. Resin and turpentine factories under government auspices have been established, but most of the lumber used locally is by the building trades for construction of dwellings — either the land based type or the world famous houseboats which ply the rivers, canals and lakes of the Jhelum Valley.

Kashmir is famous for its works of art, including fine shawls which are reputedly impossible for outsiders to imitate at any cost. A good Pushmina shawl is worth $3,000, has dimensions of five by sixteen feet, and is so sheer that the entire garment can be pulled through a wedding band. The varied skills of home craftmanship produce blankets, embroidery, carpets, tapestry, pottery, carvings, jewelry, engravings and textiles utilizing silk, cotton, wool, wood, leather, silver, brass, copper, iron, jade, sapphire and turquoise. Papier-mâché molding was adopted from the Persians and has achieved prominence in the number of durable objects such as candlesticks, bowls, boxes, trays and teapots turned out to perfection by the artisans. The articles are first polished with pumice stone, then glazed with rice water. Furs of many varieties can be purchased locally among which are squirrel, cat, fox, bear, otter and panther but the more prized are the stone marten and the snow leopard. Ibexes, markhors, shapoos and other ovine animals are a favourite target for sportsmen in Ladakh, Astor and Baltistan.

Although agriculture is the principal occupation of 80 percent of the Kashmiris, an actual deficiency exists in the production of agricultural crops. Less than six percent of the total area of the state is cultivable and water is so absolutely essential for agriculture that it must be provided by irrigation in rainfall deficient areas. In addition to these major drawbacks, methods of cultivation are antiquated, land holdings are fragmentary and



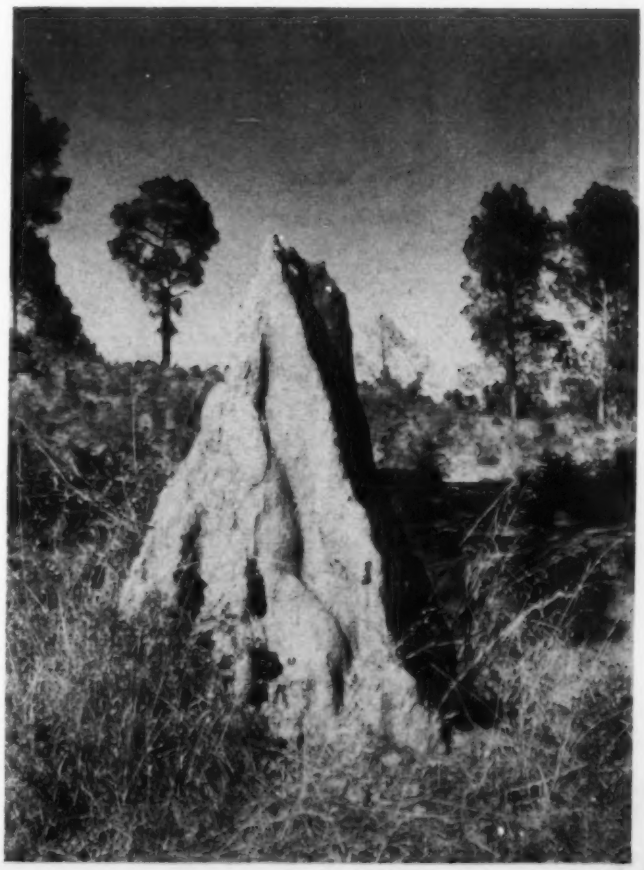
*This temple, the largest in the city of Jammu, is constructed of white-washed masonry; the steeples are painted with gold-coloured paint.*

tribute is still levied against the farmer. The new land-reform decree has set a maximum of 22½ acres for any one holding and since instigation has made adjustments on 230,000 acres, returning land to those who actually till the soil.

Of its 2,300,000 cultivable acres, about 700,000 acres are irrigated and in Jammu Province alone there are over 500 miles of main channels and distributaries. Streams are capable of sudden rises without warning, especially in the spring season when the sandy soils are viscous with the water from snow melt and numerous bubbling springs. The drainage pattern along the Jhelum River is rather indefinite with its numerous canals and lakes and glacier fed streams, some of which are said to rise from subterranean aquifers emerging beneath the bed of certain lakes. After seeing the labyrinth of canals, floating vegetable gardens and the Venice-like transport system of Srinagar, it is difficult to imagine a possible scarcity of water elsewhere. The famous floating gardens of the Dal and other lakes are reed structures filled with mud and manure which can be moved about from place to place to produce a significant tonnage of tomatoes, cabbages, cauliflowers, artichokes, kale, beets, onions and garlic.

Water-loving rice has become the staple food of the Kashmiri, not perhaps because of its versatility as a food but because the yield per acre is greater than other grains and this is particularly true in areas where the climate is suitable for double cropping. The yield from reclaimed swamplands or the flood-plains of temperate valleys often doubles that of the 650 to 900 pounds of rice per acre produced in the hill country. Therefore, though the temperature and rainfall regimes of several areas are just as suitable for wheat, maize, barley and oats, rice has become predominant.

Rice is grown up to elevations of 7,000 feet through the use of hillside terraces and above this height terrace cultivation is practiced for other crops such as potatoes, barley or buckwheat. Early maturing varieties have been imported from Russia and China and both red and white rice are grown, although red rice is preferred over the white type, due to its hardy nature. The average rice yield is



*These ant hills of sun-baked clay may rise to a height well above a man. The ants often share these dwellings with small poisonous snakes who provide a measure of protection.*

XUM

*Muzzaffarabad Fort, once a stronghold for the Mogul Empire, still displays the sound knowledge of engineering and of the military arts of its builders.*

1,400 pounds per acre, while that of wheat averages but 575 pounds.

After rice, maize is next important as a food crop. Enormous quantities are raised in good years along the banks of the Jhelum River where the black peaty land requires little or no fertilizing.

Wheat is second to maize in the number of acres actually planted, despite the fact, that as a general rule, the Kashmiri shows little fondness for the grain. According to the locality, barley flour or wheat flour is often stirred into boiling tea, and after the mixture has assumed the consistency of a dumpling, it is eaten with the fingers as a great delicacy. Barley occupies only one-twelfth the number of acres devoted to wheat, but it is very important in the highland areas where its particular hardiness makes it a favourite grain. Barley seed is imported from Canada. Rye and several small grains are of local importance.

Among the commercial vegetable products are saffron which is used as a dye and as an internal medicine and several varieties of oil seed. Everyone, with even the most minute garden plot, attempts to grow vegetables which are very good and usually plentiful.

*A soldier crossing the icy, racing waters of the Jhelum River on a flimsy-looking but strongly anchored, 1½ inch steel cable.*

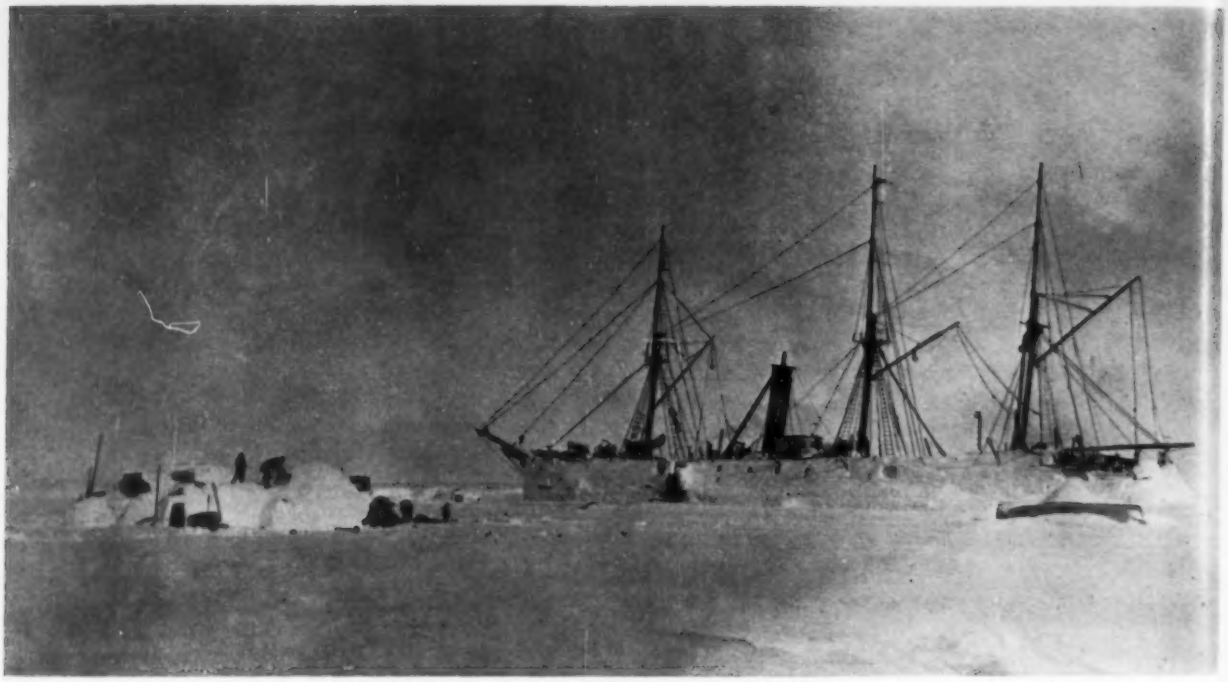
The importance of fruit to the life of the Kashmiri cannot be overestimated. The apple, apricot, pear, mulberry, and the gooseberry, currant and strawberry are native to the area and grow abundantly delicious fruits. Peaches, plums and cherries are largely confined to orchards. There are 16 different species of walnuts, 40 varieties of almonds, sweet smelling pomegranates and copious vineyards of succulent grapes introduced from Bordeaux. In the Hunza Valley and other isolated localities, dried apricots and their equally nutritious seeds, dried pears and the rich meat of walnuts are a large part of the winter diet which is supplemented with millet, barley, wheat or gram. Dried fruits from more productive areas are an export crop such as the apricots of Gilgit and the raisins of Ladakh.

### Kashmir Today

Kashmir is currently operating under a series of Five Year Plans which continue to place growing emphasis on education. Almost one-sixth of the state budget, or approximately $5,500,000 now goes toward the improvement of education facilities. The remainder is divided among highways and reconstruction, national army, hydro-electric improvements and sericulture.

Around 1900, the main exports from Kashmir were *ghee* (essence of butter), wool, fruits (fresh and dried), hides and skins, and drugs and medicines; imports were easily tabulated as piece goods (from India and Europe), sugar, salt, tea, metals, tobacco and petroleum. Today, the import picture is almost identical with that of 1900 as far as the kind and relative importance of products are concerned. The export ledger has changed somewhat with wood and wood manufactures leading, followed by fruits and vegetables, silks and fabrics, food grains, medicines, and leather, hides and skins. *Ghee*, the leader in 1900, now ranks near the bottom of the listing which might be a reflection of the increased production of oil seeds. Where once the trade of Kashmir was with India, Central Asia and European countries, it has today become more restricted. With the closing of the passes between Gilgit and Sinkiang, trade in carpets, hessian and pottery over this route diminished. The avenues which remain open are those with Pakistan to the west and India to the south. Although there are certain restrictions on trade even between these countries, business on the whole could be described as good. On the trading and commercial horizon, the growing tourist industry appears to be most promising.

*Kashmiri wood carvers at work amidst samples of their art.* Government of India



*The Neptune iced in at Cape Fullerton for the winter.* L. E. Borden

# Northward 1903-04

*by* K. ETHEL BORDEN

THE SHIP came up on May 11, 1904 with a great commotion at 1.15 in the morning. She had left her bedding in the ice and had risen about fifteen inches. She seemed to be striking and recoiling, and now the ice was moving on her sides. This was the first movement of the ship since October 1903—the reaction of the entire ship's company was instantaneous and joyful, for it meant release from their winter prison. The ship was the Dominion Government Steamship *Neptune* on the first Canadian Government expedition to Hudson Bay and northward under the aegis of the then Department of Marine and Fisheries. The *Neptune* was wintering in the vicinity of Cape Fullerton about one hundred miles north of Chesterfield Inlet in Hudson Bay. The American whaling schooner *Era* was also anchored there, some seventy-five yards from the *Neptune*.

Most of the whaling in Hudson Bay had been done by United States vessels, and in the previous seven years, over one and one-third million dollars had been realized in fifty voyages, according to United States statistics. Canada maintained that the three mile limit did not apply to Hudson Bay and other inland waterways. Therefore, the first objective of this expedition was to establish the North West Mounted Police as the R.C.M.P. were then known, in the eastern Arctic to enforce law and order. Whaling and the preservation of the musk-oxen were of special concern. Many of the musk-oxen had been taken out for museums and for hides, and it was feared that these shaggy animals would meet the fate of the prairie bison. The second objective was to take formal possession of all the Arctic islands in the name of King Edward VII and the Dominion of Canada. The third objective was to gather information and make reports on the health of the Eskimos, the geology, botany, zoology, meteorology, and topographical surveys of the areas covered by the expedition.

A. P. Low, B.Sc., was appointed, under letters patent, Commander of this first Canadian expedition by the then Minister of Marine and Fisheries, the Honourable Raymond Préfontaine, K.C. Mr. Low was a well-

known and recognized geologist who had already made some valuable surveys and explorations for Canada.

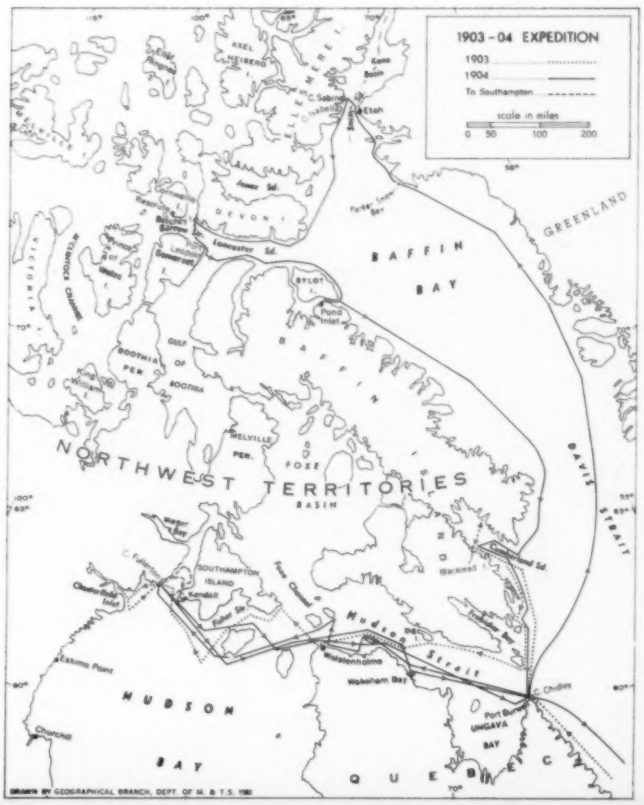
The steamer, *Neptune*, was obtained from the Job Brothers of St. John's, Newfoundland, and was brought to the Marine and Fisheries wharf at Halifax for refitting by Captain Sam Bartlett, who was to be the ship's Master and the navigating officer for the expedition. Captain Bartlett had wintered at Etah in Greenland with the Peary expedition of which he was the Captain.

The *Neptune* had been built in the Old Country specially for the sealing fleet. She was of four hundred and sixty-five tons net register, with auxiliary steam and sail, and was capable of eight knots an hour. She was a wooden ship built of oak and sheathed with 'iron bark' and greenheart. There was an inner and outer sheathing and between these, she was filled with rock salt so that her sides were practically eighteen inches thick in all parts where contact with the ice was expected. The bow was eight feet of solid oak reinforced with iron plates. She had been well saturated with seal oil and when the coaling was finished, the coal dust and seal oil formed a veritable cement which proved its worth later on in the far north.

Dr. L. E. Borden of Dalhousie University was appointed surgeon and botanist in June 1903, and immediately began his duties as surgeon. He had to order medical and surgical supplies essential for the welfare of the crew and also an emergency supply which could be used by lay personnel and which would be left at the North West Mounted Police post. In addition to this he had to visualize the possible needs of the unknown Eskimo population, for he had been commissioned to report on all disease with special reference to cancer, syphilis, and tuberculosis. The naturalist, Andrew Halkett, would need formaldehyde to preserve any specimens he might acquire, but how much? Without experience and without a reference book to guide him, Dr. Borden made a good estimate of the necessary supplies to meet all needs, with the exception of an eye spud. Dr. Borden's next task was to examine and pass as medically fit all employees of the expedition. The crew of twenty-two men were mostly Newfoundlanders and were well-seasoned, sea-faring men who were thoroughly acquainted with ice conditions; the officers of the navigating staff and the five of what Commander Low called his scientific party were also found in excellent condition. The medical assistant, Dr. Faribault, arrived the evening of departure. He became very ill during the course of the expedition, and required much attention before he died at Cape Fullerton the following April.

Major J. D. Moodie of the North West Mounted Police was appointed Acting Commissioner of the unorganized Northeastern Territories. He, with Staff-Sergeant Dee and four constables were to enforce law and order in the eastern Arctic. Supplies and equipment were taken aboard to build a headquarters for the police at Cape Fullerton.

The ship was made ready and, loaded to capacity, steamed out of Halifax harbour on August 22, 1903. The trip north through the Strait of Belle Isle and along the Labrador coast was interesting and particularly Nachvak Bay where Lord Strathcona had spent his early days on the Hudson's Bay Company post. The interpreter whom the expedition were to contact there had gone to Port Burwell where he later joined the *Neptune*. A



*Officers of the* Neptune. *Standing are: J. Hearn, J. Crossman, S. Bruchett, L. Guay. Seated: M. Bartlett, Captain Sam Bartlett, Commander A. P. Low, W. Crossman, Dr. L. E. Borden.*
C. F. King

customs office was established at Port Burwell where ships entering or leaving Hudson Bay or other inland waters were to report.

Cumberland Gulf along the east coast of Baffin Island was explored to investigate whaling conditions. Pausing at Blacklead Island, the expedition met the Reverend E. J. Peck, an Anglican missionary who had been there for some years and had translated the Gospels and some hymns from Cree syllabics into the Eskimo language. The only other missions encountered were the Moravian along the Labrador coast. Ice was already forming but the expedition stopped at Charles Island long enough to secure a supply of walrus meat for dog food.

*Some members of the scientific party. Standing: A. Halkett, C. F. King. Seated: G. F. Coldwell, Dr. L. E. Borden, M. Ross.*
A. P. Low

Then the search for winter quarters and for any vessels poaching in Hudson Bay began in real earnest. A spot near Cape Fullerton was selected. Winter clothes of fur were needed so, in a coal burning launch, Commander Low and a small party went to Chesterfield Inlet to negotiate with some Eskimos. Unfortunately, the launch was wrecked on a rock. The bad news was brought to the *Neptune* by three of the crew in an open sail boat eight days later. On the way to the rescue, with both Captain Bartlett and Captain Comer of the *Era* on the bridge with the Eskimo guides, the *Neptune* ran on a sand bar and nearly keeled over. The absence of charts and the unknown depth of the water were the contributing factors, and the crew were grateful when the ship slipped off on the third strike. However, the rescue was completed after much anxiety, and some men had to be treated for shock.

A favourable location to anchor the ship for the winter was found part way between the mainland at Cape Fullerton and Store Island where excessive pressure from ice could not be exerted after complete freeze-up. The bow of the ship was faced north in order that the ice would melt equally on either side when spring arrived. Of immediate concern was the water supply for drinking, cooking, and bathing. A suitable lake was found and

*A game of soccer on the ice at Cape Fullerton.* A. P. Low

ice blocks were cut and stored around the edge to be hauled to the ship as required. Then two boats with emergency food and other supplies were stored on Store Island.

After complete freeze-up, life took on a routine aspect. As there was no outside communication, the morale of the men was of prime consideration. Continuous propinquity may lead to irritation or intolerance almost anywhere and it was known that the tempers of men so closely confined in northern latitudes had flared and caused trouble. Lectures were given and well attended. Trap lines were set and although the take was meagre, the exercise was good. Football games on the ice between the crews of the *Neptune* and of the *Era* gave some friendly competition. Fish were caught by means of a large hook through the ice on the lakes. Dances were the highlight of the activities after the decks of the *Neptune* had been iglooed. The Eskimos loved to dance and always enjoyed the refreshments. The spiritual needs were met with religious services each Sunday conducted by either Major Moodie or Dr. Borden. All these activities kept the company in a fairly healthy condition, but as everywhere, minor accidents occurred. Broken ice floes made huge hummocks along the shore line. Some sprains and sore backs as a result of negotiating these hazards made it necessary for Commander Low to order that no one could leave the ship alone.

The police headquarters had been built on the mainland at Cape Fullerton and was called "Government House". The King's birthday, November 9, was duly celebrated with flags flying and a small cannon was fired in salute. Fireworks and a few rockets created a gay spectacle in the dark. The reception, more realistically called a powwow, had to be postponed until the 14th of November at Government House because of a severe storm. However, the big day was quite a success with Eskimos and whites in attendance. Major Moodie, through the interpreter, made a speech. In part, he said that he had been sent by the big Chief across the water to see that they did what was right; to settle all quarrels; to punish all offenders; and that the Eskimos could kill musk-oxen for food but not to sell. Then he gave each of the older men a suit of underwear and the younger, a toque, pair of mittens and a sash. Their "Tuani mick" (thank-you) was heard in all degrees of vehemence with an occasional whoop while tea was served.

Not all of the Eskimos were bright and gay. Medical care had been non-existent and the doctor soon found work to do. A women had a sore leg, another had hemiplegia, yet another was totally blind for years with cataracts in both eyes. The doctor drew a diagram and within two weeks, Harry, an Eskimo genius, carved and polished two ivory eyes spuds which were used successfully under the most primitive conditions.

Dr. Borden wrote in his diary: "I have been making trips daily to see the sick and give

*Facial markings indicate this Eskimo woman's married status.* L. E. Borden

them medicine. Opening big enough to crawl through on hands and knees. The sick people are in awful condition." A woman during childbirth attended herself. A comprehensive report of conditions as Dr. Borden found them was made for the Government and is also contained in his memoirs.

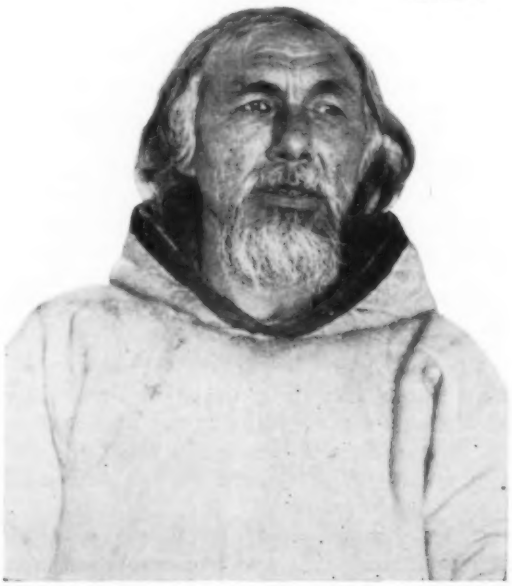
Meteorological observations under the direction of C. F. King were made twice daily outside the ship. Most of the snowfall was in late autumn or early spring, and the snow was hard and granular, almost like sand. The wind blew constantly and often reached a velocity of 60 miles per hour. It was during one of these gales that a cabin boy, F. O'Connell, went out alone and was lost despite an intensive search. The ice in the harbour reached a depth of 75 inches. On the whole, the weather was severe with a minimum of minus 53 degrees Fahrenheit.

Professor Halkett as naturalist made an excellent contribution collecting many specimens, and his records of the birds observed was published in *The Auk* in 1905.

The schooner *Era* was of special interest for instructions had been given to find any vessels poaching in Canadian waters and one was found to be near Cape Fullerton for the winter. When the proclamation of regulations regarding musk-oxen, whaling, and other matters was posted, Captain Comer of the *Era* was much disturbed. He had been whaling for some years in the waters of Hudson Bay and had used Eskimos in his ventures. He deeply resented the introduction of Canadian law and order and felt that Major Moodie was doing this for spite. Captain Comer also had trouble with his men and put one in irons. He blamed the crew of the *Neptune* for this mild mutiny and with possible justification, for the crew of the latter were well-cared for in every respect, whilst his men had most miserable quarters and the poorest of foods—not even potatoes. Anti-scorbutics were unheard of on the *Era*. An outbreak of scurvy was brought under control by medication and food from the *Neptune* but one man succumbed and another was invalided home later. Captain Comer and most of his men were given medical care by Dr. Borden.

On June 15, 1904, Commander Low, Dr. Borden and two crew members, C. Pomeroy and W. Babstock, undertook a trip with eight Eskimos in three of the ship's boats to Southampton Island—a distance of forty-five miles. Ice-flows, ice pans, snow, rain, and gales made the going rough with many narrow escapes. Often the boats had to be pulled onto an ice pan to avoid being crushed.

*Harry, the Chief of the Aivillingmiut.* A. P. Low



*A group of Eskimo women in their finery. Insets of lighter fur in the clothing were done with the use of a bone needle and sinews for thread.* A. P. Low

Because it was necessary to make detours, it was five days before the party reached Cape Kendall. At Cape Kendall, some geological and botanical explorations were made. No inhabitants were seen but early stone dwellings containing human bones were found. A suitable mound was erected and on June 23, Commander Low placed a proclamation of possession in a metal box and deposited it in the mound while the company sang "God Save the King." On the return trip they had the pleasure of seeing the midnight sun in all its glory.

After weeks of preparation, the *Neptune* finally set sail on July 18 from her winter moorings amid salutes from the police and the *Era* and cheers from the Eskimos. The ship sailed for eight days through floating ice and fog, rain, snow, and gale force winds. The constant ramming of large ice floes and the banging of the propeller made everyone tired and haggard from little rest and lack of sleep. En route to Port Burwell, they were stuck fast for six hours and they shot three bears while waiting for a break in the ice.

At Port Burwell, the sight of the supply ship, *Erik*, dispelled all fatigue for there would be mail and news from the outside world after eleven months. Some disappointment was felt over no replies to letters written in December and given to some Eskimos to take to Fort Churchill for mailing. (Three years later the leather bag was found and delivered to the post office.) Commander Low had orders to proceed northward as originally planned. Major Moodie decided to return to Ottawa and elected to go south on the *Erik*. The second steward of the *Neptune* and a sailor from the *Era* were also transferred to the *Erik*. Mr. G. F. Caldwell decided to survey rather than risk any more voyaging. The week's sojourn at Port Burwell was marred by the mosquitoes which were reported to be larger, more vicious and more numerous than any yet encountered.

The summer cruise began on August 3 in foggy weather, and heavy ice along the Baffin Island shore impeded progress. Therefore it



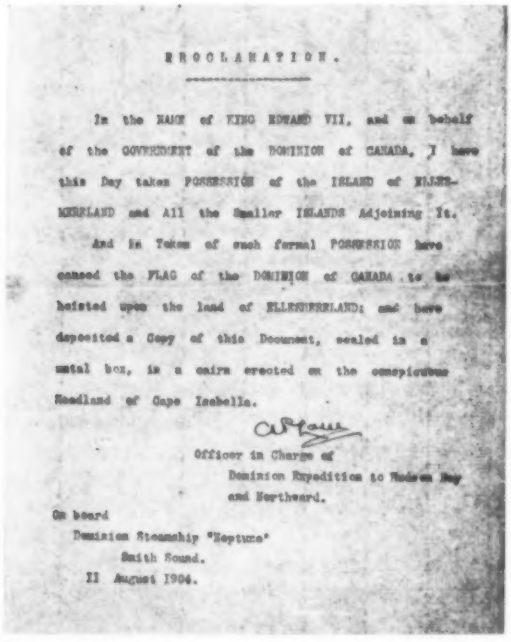
XUM

was necessary to skirt the Greenland coast but large icebergs made navigation dangerous. Heavy gales at 74 degrees North latitude sent the expedition scurrying into Parker Snow Bay for refuge. After the storm abated, a party went ashore to see the glaciers and found flowers that seemed to be growing out of the ice. At Etah some underground dwellings and some coal were seen but no inhabitants. Life was most irregular with twenty-four hours of daylight.

Crossing Smith Sound through pans of thick ice, they landed at Cape Sabine, 78 degrees 30′ N. latitude, on August 10. A party went ashore to visit the last winter quarters of the ill-fated Greely expedition. No inhabitants but some Eskimo and Greely expedition graves were seen. A good sized hare was knocked off with a rock before a signal from the ship hastened them back. The ice was closing in.

Captain Bartlett was steering a course full speed ahead between what he thought were two small icebergs when suddenly the *Neptune* hit. Mose Bartlett, the second mate was in the barrel (the lookout at the masthead), and grabbing his cap shouted: "Don't ring her off!" The ship struck again amidships and then at the stern. The seal oil and coal dust cement proved invaluable for otherwise the ship could not have stayed afloat. When in the drydock at Halifax later, it was found that the iron stem plate and 75 feet of keel was missing, and the stern post was twisted and broken. However, when it was discovered that the ship was taking little water, the task of taking possession of Ellesmere Island was undertaken. The Commander and a party went ashore at Cape Isabella*, the proclamation was read, the flag raised, and with three cheers for the King the proclamation was placed in a metal box in the cairn. Upon returning to the ship, Commander Low handed Dr. Borden a signed copy of the proclamation, saying, "You had better have this for your diary." This copy remained in Dr. Borden's possession for fifty-two years. From Cape Isabella surveying was made as close to shore as ice would permit and a chart was made.

Public Archives



PROCLAMATION.

In the NAME of KING EDWARD VII, and on behalf of the GOVERNMENT of the DOMINION of CANADA, I have this Day taken POSSESSION of the ISLAND of ELLESMERELAND and All the Smaller ISLANDS Adjoining It.

And in Token of such formal POSSESSION have caused the FLAG of the DOMINION of CANADA to be hoisted upon the land of ELLESMERELAND; and have deposited a Copy of this Document, sealed in a metal box, in a cairn erected on the conspicuous Headland of Cape Isabella.

Officer in Charge of Dominion Expedition to Hudson Bay and Northward.

On board
Dominion Steamship "Neptune"
Smith Sound.
11 August 1904.

The next objective was Beechey Island in Erebus Bay along Lancaster Sound where John Franklin wintered from 1845-46. Near the monument erected to his memory, the company found a sealed tin case in which a record of the Norwegian Magnetic Pole Expedition of 1903 was found. As this was the last tidings from the expedition on the *Gjoa*, the record was removed and sent to the Norwegian Government. After cruising Barrow Strait towards Somerset Island, the lookout reported a Danish flag flying on a picturesque point known as Port Leopold. Fearing some disaster, the doctor with others went ashore but found no one. A cache of provisions had been left for the *Gjoa* near the boiler of the Danish steam launch over which the Danish flag flew. Ice and fog detained the *Neptune*, and later on August 17 a landing was made, and with the usual formalities the proclamation of possession and a copy of customs regulations were deposited in the boiler.

Heavy fog in Lancaster Sound made the going very slow but eventually Pond Inlet was reached where Commander Low went ashore and learned that whalers were in the bay. Proceeding forthwith, the *Neptune* met the *Eclipse* with Captain Milne in command,

*Commander Low in *The Cruise of the Neptune* states that the proclamation was deposited at Cape Herschel.

*The crew of the* Neptune *at Sir John Franklin's monument at Erebus Bay, Beechey Island.* A. P. Low

and the *Diana* with Captain Adams, both vessels from Dundee, Scotland. Refreshing entertainment with interesting tales of their experience as whalers made a break for the company of the *Neptune*. While some visited, others went to the mouth of a stream and netted over a thousand salmon trout. What a delicacy after boiled sow belly!

An epidemic was prevalant amongt he Eskimos but neither time nor facilities were available for a close study. However, Dr. Paton of the *Diana* in conference with Dr. Borden agreed there was a possibility of a form of malaria*. Respirations were recorded as 24 and the spleen enlarged.

After a month of cruising through icy waters with only one fine day recorded, the expedition again reached Port Burwell. Coal and provisions were loaded for the police post at Cape Fullerton, and a native pilot was taken aboard at Wakeham Bay. More snow and wind impeded progress but aided surveying which was continued until Cape Fullerton was reached. There the Eskimos made a warm welcome. Two of the police had signs of scurvy and were found to be quite ill with rheumatism, and so would have to be invalided home. The *Neptune* returned under amazingly pleasant weather to Port Burwell, where the Arctic supply ship had arrived.

Now it was homeward bound; members of the scientific party had concluded their reports for Commander Low to take to Ottawa. However, a storm encountered in the Gulf of St. Lawrence kept everyone busy, for the ship needed two at the wheel. For twenty-four hours all they could do was to keep her head on to the waves which were breaking over the bow and coming level with the bridge deck. However, the *Neptune* rode out this and a second storm successfully, and she entered Halifax harbour on October 12, 1904, with mission accomplished.

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*Commander Low mentions typhoid-pneumonia in his report, *the Cruise of the Neptune*.

SOURCES:

Low, A. P. Report on the Dominion Government Expedition to Hudson Bay and the Arctic Islands, 1903-04 ("The Cruise of the *Neptune*"). Ottawa, 1906.

Dr. L. E. Borden's diary and memoirs.

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## EDITOR'S NOTE-BOOK

J. L. Charles (*Railways March Northward*) has been Consulting Engineer with the Canadian National Railways since 1957. He was born in England, and emigrated to Canada at eighteen years of age. He then obtained employment at Edmonton as a chainman on railway surveys.

Major Charles served with the 90th Winnipeg Rifles, the Canadian Engineers, and the Canadian Railway Troops during the First World War, and was demobilized with the rank of Major, having been awarded the D.S.O. and twice mentioned in despatches. Between the two World Wars, Major Charles was engaged in railway reconnaissance, location, construction, and maintenance with the Canadian National Railways. During the Second World War, he served with the Royal Canadian Engineers, and recruited the 20th Field Company, R.C.E. In 1942, he served with the United States Army Engineers to survey the military railway, projected from Prince George, British Columbia, to Alaska.

From 1945 until 1957, Major Charles held the position with the Canadian National Railways of Chief Engineer, Western Region.

* * *

S. C. Wiley (*Kashmir*) is native of Huntington, West Virginia, and was educated at Marshall College, the University of Nebraska, and the Ohio State University. In 1960, he returned to the United States after having served for three years as head of the Foreign Geography section of the Geographical Branch, Department of Mines and Technical Surveys in Ottawa.

* * *

K. Ethel Borden (*Northward, 1903-04*) is the wife of Dr. L. E. Borden, the surgeon of the 1903-04 expedition. A native of Manitoba and having graduated from the Winnipeg General School of Nursing, Mrs. Borden served overseas during the Second World War as Nursing Sister and then as acting Assistant Matron with the Canadian Army Medical Corps. After the war, she served as Superintendent of Nurses at the Emergency

Hospital, Mayo Clinic, and then as Superintendant, of the hospital at Nelson, British Columbia. After a motor accident ended her hospital career, she became an underwriter with the Sun Life Assurance Company of Canada.

## AMONGST THE NEW BOOKS

### Search in the North

*by Guy Blanchet*

(The Macmillan Company of Canada, Limited, Toronto. 197 pp. $3.50)

In the December, 1930, issue of the Canadian Geographical Journal, an article by Guy Blanchet appeared describing an aerial search for the passengers and crews of two aircraft downed and out of fuel on the Arctic coast. This was the MacAlpine search, and was merely the last, unplanned act in the first organized aerial search for minerals in the Canadian Arctic. The MacAlpine search has been described in other publications, but the full story, reviewed here, of the prospecting expedition has only now been written and is a welcome addition to northern literature.

Capital was abundant in the mineral industry in 1928 and aircraft were considered sufficiently well-developed to make aerial prospecting possible and practicable in the almost completely unexplored Arctic mainland. Because of his experience in surveying north of Great Bear Lake, Blanchet was selected to direct the field operations of the Dominion Explorers' expedition which was landed at Tavani on the west coast of Hudson Bay by the former rum-running schooner *Morso*. The problems of this pioneer venture, from the departure from Halifax to the successful culmination of the MacAlpine search eighteen months later, are described in *Search in the North*.

The aerial prospecting by Dominion Explorers and other companies in 1928 did not result in any important discoveries, save the nickel-copper deposit at Rankin Inlet, recently developed and presently producing. But the thousands of miles flown added many features to the maps and resulted in flying experience which contributed to the establishment of scheduled air services along the Mackenzie and the increased use of aircraft by prospecting companies.

Although the informal style adopted by Blanchet perhaps makes the narrative more acceptable to the general public, his apparently deliberate reluctance to identify the pilots or the numerous post residents is difficult to understand. These were historic years in northern flying and the pilots and mechanics mentioned in the book were the stuff of which history is made. Much of interest could have been so easily added, and the anonymity of Broatch, Sutton and Vance, all killed in crashes the following year, is annoying and unnecessary. Without some searching in other reports of the MacAlpine episode, who would know that Blanchet's "Ken" refers to Bertie Hollick-Kenyon, later chosen to pilot Ellesworth in Antartica? No mention is made of Thompson and McMillan, pilots of the MacAlpine party (Stan McMillan was operating from Cambridge Bay 25 years later during the construction stage of the DEW Line). The "all safe" radio message from the *Bay Maud* at Cambridge Bay reached Bathurst Inlet via the *Fort James* wintering at Gjoa Haven on King William Island. The history of one of the planes abandoned at Dease Point is worth a page or two, for in it "Punch" Dickims made the first flight across the "barrens" from Chesterfield to Stony Rapids in 1928, for which he received the McKee Trophy; and in 1930, after this Fokker aircraft had braved the winter untended, Walter Gilbert used it to make a successful and uneventful flight to Boothia Peninsula and the scene of the Franklin disaster. These are errors of omission, to be sure, but somehow one feels that they would have added icing to the cake and made the story more complete.

The illustrations, most of which have been previously published, are reproduced poorly and one expects a better map from an experienced surveyor. Despite these faults and omissions, the book has a ring of authenticity. Blanchet's descriptions of the terrain and the people provide a harsh background against which his assessment of the problems of early northern flying stands out vividly. Despite the immensely improved aircraft and communications of today, the following excerpt from Blanchet's log of 1929 still holds true three decades later: "How simple this flight is when all is going well. There is scarcely an incident of travel or an observation worthy of more than a general note. But let some small thing happen, failure of the machine or bad judgment at the controls and we should be plunged into a life as primitive as in the Stone Age . . .".

J. KEITH FRASER.

*Mr. Keith Fraser is in the Northern Canada Section of the Geographical Branch of the Department of Mines and Technical Surveys, Ottawa.*

**Note**

Since this review was written, Roy Brown, one of the aviation pioneers mentioned in the book, died in Winnipeg, on 30 November 1960.

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**Treasure in the Rock**
*by Helen Bush*
(Longmans Green and Company, Toronto. $4.50)

Within the past few decades museums in many countries, seeking to promote interest in natural history, archaeology and kindred subjects amongst young people, have enlisted their scientific staff and other specialists to produce short books and illustrated guides. Some have been very successful in this undeniably difficult field of scientific writing, and it is significant that the best-sellers are almost always those written with the most careful attention to detail and to the manner of illustration. Unfortunately *Treasure in the Rock* is not in this latter class and this is all the greater pity because Canada needs good natural history and science books for young people.

The volume comprises four sections — *The story of rocks*, *The story of minerals*, *The story of fossils* and *The story of North America;* some 132 pages with numerous illustrations. Narratives such as these invariably rely to some extent upon the use of clear photographs, line drawings and diagrams, and each new book in its turn has the chance to, and ought to, add something original or better to the existing literature. Mrs. Bush, however, has collected only a few good photographs and a plethora of diagrams, sketches and "reconstructions" which are extremely poor. There can be little point in an artist's preparing new illustrations if they include inaccuracies and fallacies. There is certainly no shortage of first-rate illustrations to be had, which would have served the purpose so much better. For example, the photographs of hand-specimens of rocks could be extremely instructive if carefully labelled and showing critical features. Again, compare the figures of the fossils with those that have appeared in many recent geology or paleontology books. Clearly it is imperative to illustrate properly for young people a text of this kind, with attention to pictorial appeal and scientific accuracy — it is a pity that this has not been so accomplished here.

The text is largely, though not always, in the same poor vein. The sensational is sometimes stressed at the expense of good writing and comprehensiveness, and both spelling mistakes and printer's errors remain. It could only be carelessness that allows the author to credit the ammonites with having appeared as early as the Devonian and to list the Geological Survey of Canada as a branch of the Department of Mines and Resources in Section I, though she has the Department correctly named in Section IV.

In *The story of North America*, perhaps, lay the real opportunity, the chance to produce a short, crisp but colourful geological history of this fascinating continent. Alas, this section becomes particularly flat and monotonous in style and it is disappointing not to have more than four small maps to cover the many fantastic changes of geography.

There are today many paperback and pocket editions devoted to the story of rocks, fossils and minerals. Almost all are excellent and cheap. By comparison the present book is often amateurish, and even the chapters on Rock Collecting As a Hobby, Enjoying Minerals in the Home, and Fossil Collecting As a Hobby will not take the enthusiast very far in his pursuits. The idea behind this production is a good one but the execution leaves very much to be desired. The book was sponsored by the Royal Ontario Museum; it is to be hoped that the Museum has better things in store.

D. L. DINELEY

*Dr. Dineley is Professor of Geology at the University of Ottawa.*

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## *Society Affairs*

### ANNUAL MEETING

The thirty-second Annual General Meeting of the Society will be held in the Lecture Hall of the National Museum of Canada at Ottawa on Monday, the 20th of February, 1961, at 8:30 p.m.

The guest speaker will be His Excellency Sir Saville Garner, K.C.M.G., High Commissioner to Canada for the United Kingdom.

### MEMBERSHIP CAMPAIGN

The Society will be continuing its membership campaign by direct mail to selected lists of people in January. Since we cannot check these lists against our records, some members may receive such literature.

Should this happen, we hope that you will appreciate our problem and bear with us in our efforts to strengthen the Society.

In these days when Arctic flying is an everyday occurrence, it is well to remember the pioneers who made this possible. Our picture is a segment of one that will appear in the February issue in "The Hudson Strait Expedition 1927-28" by Wing Commander R. V. Manning, the official historian of the Royal Canadian Air Force.

## *Information and Enquiries About Membership*

We recorded last month a healthy growth in Society membership during 1960. Also during the past year some changes have been made in the Journal itself, including a modest start in the use of colour. Full support of the membership campaign by our present members will enable this trend to be continued and expanded. Our aim is to supply a better and better Journal to more and more readers. Your help will be vital to achievement of this goal.

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***Recently Received from Publishers***

*Grasses.* By Irmengarde Eberle. (Oxford University Press, Toronto). This book explains the importance of different grasses to all life on earth. It is tastefully presented with illustrations by Ezra Jack Keats.

* * *

*Half Hours with Geology.* By Herbert McKay. (Oxford University Press, Toronto). This simple introduction to the study of Geology is easy and pleasant to read and the book is illustrated with explanatory drawings.

* * *

*A History of Ancient Geography.* By E. H. Bunbury. (Dover Publications, New York). This is a monumental work in two volumes totalling 1,409 pages, and covering all that was known of Geography from the earliest times till the fall of the Roman Empire.

* * *

*Four Ways of Being Human.* By Gene Litsetzky. (The Macmillan Company of Canada, Limited). This is one of the Viking Explorer Books and describes how human life is sustained by four very primitive races who have learned the art of perfect adaptation to their particular geographical environment without the hindrance of civilization.


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